ACORN·USER

BBC MICRO · ELECTRON · ATOM

MAY 1984 £1



THE 6502 SPECIAL

Bitstik blazes second processor trail · £2500 competition prizes

Electron expansion · Super statistics! · DIY disc drives



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Typesetting & Artwork Vantage Group, Wardour St, London W1. **Production** Aquarius Print and Design Ltd, Scala St, London W1. **Printed in Great Britain** by Watmoughs Ltd, Bradford. **Advertising Agents** Computer Marketplace Ltd, 20 Orange St, London WC2H 7ED. Tel: 01-930 1612. **Distributors to the News Trade** Comag, Tavistock Rd, West Drayton, Middlesex UB7 7QE. Tel: (0895) 44405. **Subscriptions** Subs Dept, Redwood Publishing, 68 Long Acre, London WC2E 9JH. Tel: 01-836 2441.

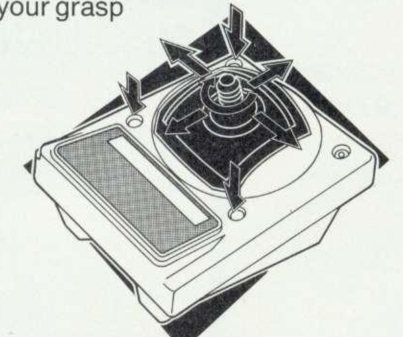
Annual subscription rates:

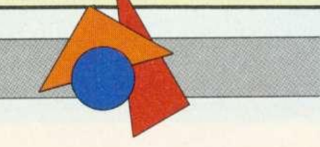
UK	£15
Europe	£18
Middle East	£20
The Americas and Africa	£22
Rest of the World	£24

These prices are inclusive of post and packing (air mail overseas) for 12 issues.



Front cover photograph by Peter Marshall





COPYRIGHT and protection are two of the dirtiest words in the English computer language.

Both topics are carefully avoided by government and software houses while the public merrily goes on its way copying anything it can get its hands on.

The software industry is finally getting off its backside to form pressure groups, and these are now crawling out of the woodwork on all sides.

First there was GOSH, the Guild of Software Houses, dominated by Virgin howling about 'A hundred million in software being ripped off every year.'

Next came the Copyright Reform Group, sending letters to the PM, with GOSH holding up the computer end.

Then there was the Tape Manufacturers' Group up in arms about the threat of levies on blank cassette tapes aimed at discouraging the music and program pirates.

Now, as we go to press, the Software Registry is popping up to fight computer piracy.

Where will it all end? That's four little outfits all yapping at the heels of government, taking MPs out to lunch, and fighting each other as all the different parties defend their own ground.

What the world wants to know is when someone is going to come to the aid of the poor punter being bamboozled, duped, ripped off with inferior products, late deliveries and disappearing cheques. The only recourse is under law, which is usually not worth the effort.

And if the law is not good enough for the computer industry, why should it be good enough for its customers?

When is the Micro Users' Group going to stand up and be counted in the halls of power? At least then everyone would be back on an even footing, and the customers could go on ripping off the houses and they could go on bamboozling the punters . . .

COMING SOON . . .

The business boom

What the Z80 second processor and the vast range of software can do for you, and how to use them.

Soft pottery

Amazing programs to create astounding and colourful images.

Tape to disc

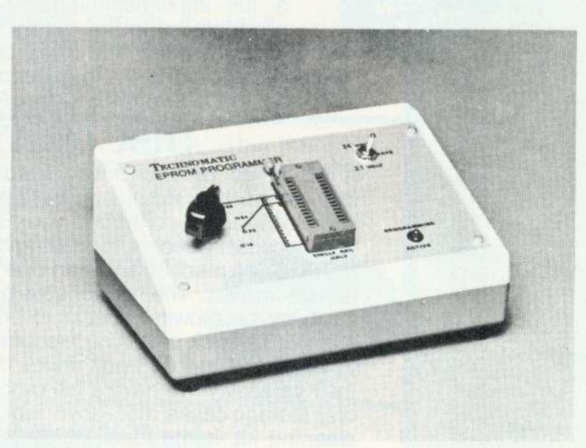
Automatic transfer of programs to save you time and bother.

TECHNOMATIC

BBC Computer & Econet Referral Centre
01-452 1500   01-450 9764   01-450 6597   Telex 922800

EPROM PROGRAMMER:

A fully self-contained mains-powered eprom programmer housed in an attractive finished case. It is able to program 2716, 2732/32A, 2764 & 27128's in a single pass. It is supplied with vastly superior software when compared to any currently available similar programmer. In addition to normal eprom programming, you are now able to load your favourite basic programs onto eprom.



The programmer comes complete with cables, software & operating manual.
£89 + £2.50 carriage. Software on disc £2 extra.

- *** Menu Driven Software provides user friendly options for programming the eprom with:**
  - **a) Basic programs.**
  - **b) Ram resident programs.**
  - **c) Any other program.**
- *** Programmer can read, blank-check, program & verify at any address/addresses on the Eprom.**
- *** Personality selection is simplified by a single rotary switch.**
- *** Programming voltage selector switch.**
- *** Full Editor with ASCII Disassembler, allowing direct modification of memory data in HEX or ASCII.**
- *** Continuous display of time left for completion of programming.**
- *** Continuous display of current addresses as they are being programmed.**

EPROM ERASERS



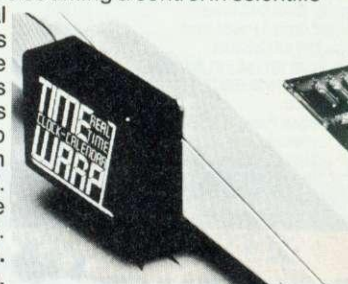
UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays.
It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 + £2 p&p.**
UV1 as above but without the timer.
£47 + £2 p&p.

SPECIAL OFFER EPSON FX 80 PRINTER ONLY £325

including BBC printer lead
Twelve Months full warranty.
Offer valid while stocks last.

'TIME-WARP' REAL-TIME-CLOCK/CALENDAR

A low cost unit that opens up the total range of Real-Time applications. With its full battery backup, possibilities include an Electronic Diary, continuous display of 'on-screen' time and date information automatic document dating, precise timing & control in scientific applications, recreational use in games etc—its uses are endless and are simply limited by one's imagination. Simply plugs into the user port—no specialist installation required—No ROMS. Supplied with extensive applications software.
Please phone for details.
£29.00 + £2.50 carriage.



SMARTMOUTH:

The original 'infinite speech'.
Still the best.
A ready built totally self contained speech synthesiser unit, attractively packaged with built-in speaker, AUX output socket etc.—no installation problems!
It allows the creation of any English word, with both ease and simplicity, while, at the same time being very economical in memory usage. You can easily add speech to most existing programs. Due to its remarkable infinite vocabulary, its uses spread throughout the whole spectrum of computer applications—these include industrial, commercial, educational, scientific, recreational etc.
No specialist installation—no need to open your computer, simply plugs into the user port—and due to the simple software, no ROMS are needed.
SMARTMOUTH is supplied with demo and development programs on cassette, and full software instructions. **£37+ £2.50 carriage.**

ELECTRON ADD ONS

NOW IN STOCK

PRINT PORT

*Suitable for most centronics printers
*Supplied complete with lead & programming.
£39 + £1.50 p&p

JOY PORT

*Controls over 80% of available arcade games.
*Uses ATARI Style 9 pin joysticks
*Just plugs in—no soldering
*Does not overload Electron psu
£14.75 + £1.60 p&p

BEEBUGSOFT

A professional range of Firmware/Software to suit both the advanced programmer and the user. From the well known 'EXMON' and 'TOOLKIT' to the WORDWISE SPELLCHECK.

See our double page spread advertisement on pages

MAIL ORDERS TO: 17 Burnley Road, London NW10 1ED
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SHOPS AT: NW London: 15 Burnley Road, London NW10 1ED
(Dollis Hill ⊖ 2 mins walk, ample car parking space)
West London: 305 Edgware Road, London W2. Tel: 01-723 0233
(Near Edgware Road ⊖)

TECHNOMATIC LTD.

All prices exclude carriage & VAT. Please add carriage as indicated and add 15% VAT to the total order value. For fast delivery telephone your order quoting VISA or Access card or official order number.
(Minimum telephone order £5).

ROM box for Electron

PLUS 1 is the name of Acorn's first add-on box for the Electron, and it is set for release in May.

The company has not confirmed a price and has yet to release any photographs of the unit. However, *Acorn User* can reveal that it has two parallel ROM sockets, as shown in our illustration.

The device includes an eight-bit A to D joystick port and a Centronics parallel printer interface. When it is fixed to the back of the Elk, by two solid bolts, it increases the size of the machine to virtually the same depth as the BBC micro.

ROM cartridge software should follow in the early summer, probably including languages such as Lisp, and possibly View.

The fact that there are two ROM sockets indicates that Acorn sees the chips being used at the same time, and it should give the micro the same capability as the Beeb's sideways ROM sockets.

Acorn is keeping quiet about details of the other add-ons, but these will fit in between Plus 1 and the Electron. Likely contenders are memory, discs and Econet.

Plus 1 supports the usual BBC printer commands, such as CTRL B to switch the printer on, CTRL C for off, and the ADVAL commands to control the joystick interface.

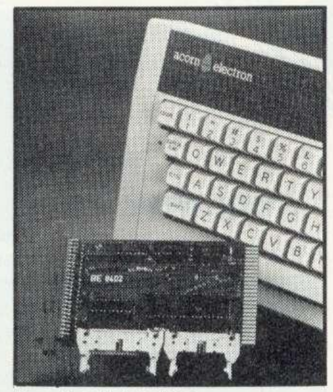
If you can't wait for the Acorn add-on, two other companies have produced interfaces for the Elk. Broadway Electronics has a printer interface and user port retailing at £46. It comes with software and screen dump, is fully Centronics compatible and supports future expansion. Broadway also has plans for a disc interface, joystick controls and a sideways ROM facility.

Even cheaper, at £25, is a straight Centronics printer interface from Micro-Z. It supports all the commands available on the BBC micro. An eight-bit parallel input/output is also included.

Broadway's address is Unit 3c, Aston Rd, Bedford. Micro-Z is at PO Box 83, Exeter, Devon EX4 7AF.

PARALLEL ROM CARTRIDGE
JOYSTICK PORT
CARTRIDGE SOCKETS CLOSED BY FLAPS WHEN NOT IN USE
PRINTER PORT
ELECTRON INTERFACE
SECURITY BOLTS FIX ON TO THE ELECTRON
PROTRUDING BLOCK FITS INTO BACK OF ELECTRON

Plus 1 for the Electron – first sighting



Broadway's interface

No cartridge boon for Beeb

THE Electron's add-on box with parallel ROM sockets is bad news for BBC micro users hoping for cartridges.

This is because the Beeb uses serial ROM technology, which has not gained favour in the computer industry and is unlikely to prove economic.

No decision has been taken to scrap serial cartridges, but they have a low priority within Acorn. The idea is reckoned to be viable for speech applications, but not for software.

Net DFS gain

DNFS is a combined disc and Econet filing system being supplied with the second processor by Acorn.

A company spokesman stresses that it is not a new version, but was produced to save a sideways ROM socket and prevent interactions between filing systems.

It was first produced for the American version of the BBC micro, where it is far more difficult to get at the PCB because of the foil 'box' inside the casing to meet US radiation standards. Also, the US machine ran out of sockets as it has DFS, NFS, and View fitted as standard.

Model C 'pure speculation' as Acorn looks to ABM

ACORN has branded rumours about a BBC model C, and a possible price rise in the Beeb itself, as 'pure speculation'.

On the model C, marketing manager Tom Hohenberg said: 'We are developing new machines. We would be silly if we weren't, but there are a number of possibilities.

'The business machine (ABM) is next, and we are working hard on the 16032 second processor.'

The only available comment from Acorn on the timing of a new home computer was: 'We would like to have something around by the end of 1984.'

Hohenberg was forthcoming on the price drop, though: 'There's no way we are bringing the price down.'

The Z80 second processor is due out in May, but no prices are being given. Information about the ABM is scarce. Tom Hohenberg again: 'There's a lot of speculation internally, never mind elsewhere.'

When pressed with suggestions as to whether a certain feature is included, the answer is: 'It might be, it might not be.'

Free ad abuse

PHONE calls to the *Acorn User* office have alerted us to the fact that some readers are abusing our free advert service.

One software house has phoned up several 'advertisers' to warn them about copying software and has informed us that they will take legal proceedings against these individuals.

Acorn User will support these attempts to prevent individuals copying tapes and selling them through the pages of this magazine.

Please do not abuse this service, and report any suspicious offers to *Acorn User*. Parents should also check that their children are not copying and selling software in this way. It is illegal.

Delay in Datagem chip from Gemini

GEMINI's impressive database management system called Datagem has been announced with a price tag of £130 – but supplies are likely to be delayed because of a world shortage of EPROM chips.

The program is designed to work solely with discs and is held in two chips with a combined memory of 24k. The main feature is that Datagem can be configured for a particular use such as stock recording or mailing lists.

Maximum file size is 10Mb, with up to 5110 records per file, and the maximum record size is 5k. Up to 62 permanent fields are allowed per record. Searching, sorting, editing and report generating facilities are all provided for data manipulation.

Other software to link to Datagem files is under development, including a chip to provide graphics and statistics.

Documentation on the database is available from Gemini that gives examples of spreadsheets, school reports and standard letters.

Gemini is at 18a Littleham Rd, Exmouth, Devon EX8 2QG.

BIC TOP TIP

ROM chips can be a nuisance to put in and out. So here's a good idea: use the top of a cheap Bic biro. The clip fits under nicely, is tapered, and, unlike a screwdriver, won't scratch the PCB.

ROMS

SOFTWARE FOR THE BBC MICRO

```
WORDWISE
(C) Computer Concepts 1982

1)  Save entire text
2)  Load new text
3)  Save marked text
4)  Load text to cursor
5)  Search and Replace
6)  Print text
7)  Preview text
8)  Spool text

ESC Edit Mode

Please enter choice_
```

WORDWISE

This ROM based word processor is simple to fit and simple to operate. Its greatest strength lies in its ease of use, yet it is a fully fledged text processing system, with all the features you would expect to find in many more expensive programs.

Once entered the user has total control over the text. Any section may be marked, this may be a word, sentence or any larger piece of text. The marked section may then be instantly deleted, moved or copied to any other point in the document. The more complex operations are menu driven so that the user is always prompted when necessary. When printing a document the user may specify the line length, line spacing, page length etc. WORDWISE even handles automatic page numbering, centering of text, justification and many more powerful features.

This word processor has become the best selling program for the BBC machine. In the year since its launch it has outsold all other available ROM, cassette or disc based word processors and continues to outsell them.

£46 incl. VAT and p&p.

```
DISC DOCTOR 1.09
  DIS <<sta>> <<end>> <<ofs>>
  DISCTAPE <afsp> <<afsp>>...
  DOWNLOAD <fsp> <<adr>>
  DSEARCH <str> <trk> <<trk><sct><drv>>
  DZAP <<trk>> <<trk><sct><drv>>
  EDIT <<key no.>>
  FIND <str>
  FORM <drv> <no. trks> <<stt>> <<S>>
  JOIN <fsp> <afsp> <<afsp>>...
  MENU <<drv>>
  MOVE <<dest page>> <<src page>>
  MSEARCH <str> <<adr>>
  MZAP <<adr>>
  PARTLOAD <fsp> <ofs> <ext> <adr>
  RECOVER <trk> <sct> <sct> <adr> <drv>
  RESTORE <trk> <sct> <sct> <adr> <drv>
  SHIFT <src> <dest> <ext>
  SWAP <<drv>>
  TAPEDISC <<fsp>>...
  VERIFY <<drv>> <<no. trks>> <<stt>>

OS 1.20
>_
```

DISC DOCTOR

Following on from WORDWISE this utility ROM is the ideal way to get the most out of your computer system. This ROM adds 20 new commands to the Machine Operating System. Most of these are concerned with DISC operation although some of the commands are totally general purpose. Disc Doctor allows up to 60 files per side of a disc and includes its own disc formatting and verifying commands. Three search commands will find any string in memory or on disc, or will list all the line numbers in a BASIC program that contain the string. Many other features include disassemblers, disc/memory editors, function key listing etc. Works with all versions of the Acorn DFS, and other Acorn compatible DFS's.

£33.35 incl. VAT and p&p.

GRAPHICS ROM

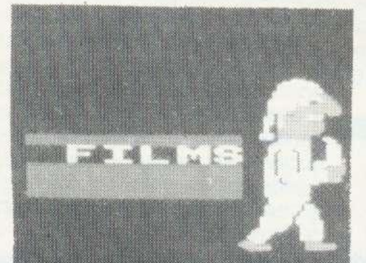
Our latest utility ROM includes over 28 new graphics related commands. These can be typed in like any normal commands and can of course, be included in BASIC programs. The commands are split into 3 distinct areas:-

1. Sprite graphics
These are multi-coloured shapes up to 24 x 24 pixels in size.
Once a sprite has been designed (using in-built routine) it can be plotted at any position on the screen and easily moved around. A sprite can also be part of a 'film' — a sequence of frames allowing animation up to 32 sprites or 'films' can be active on the screen at any time. A 'film' can contain up to 47 frames, each frame being any sprite image.

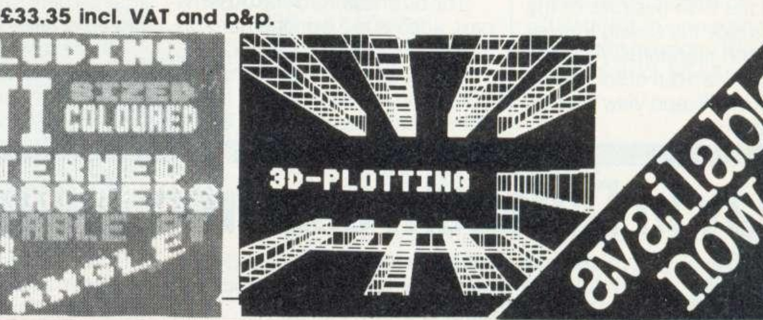
2. LOGO 'turtle' graphics
By using simple FORWARD, BACKWARD, LEFT and RIGHT commands a 'turtle' can be moved very quickly around the screen, producing intricate patterns by the most user-friendly means. Including these commands in structured BBC BASIC programs provides a system faster and more powerful than many of the packages currently used to demonstrate the LOGO language.

3. The third section consists of a large number of general purpose commands, such as:-
★ FILL which will fill ANY area on screen.
Fast circle and arc drawing
3D graphics routines allowing X, Y, Z co-ordinate plotting
Large character printing in a range of patterns
Scaling — allowing any part of the screen to be expanded or diminished
A rotate command that will rotate all plotting by any angle around the origin
Because this is a ROM, all the commands are instantly available. It has a built-in help menu showing the syntax of all commands. Supplied with a comprehensive manual and step-by-step fitting instructions, suitable even for the inexperienced. This ROM represents extremely good value for money.

£33.35 incl. VAT and p&p.













16 Wayside, Chipperfield, Hertfordshire. WD4 9JJ Telephone: Kings Langley (09277) 69727

Happy holidays with computers

GRAPHICS and design feature in the new range of computer-based holidays run by Wardle and Wardle at Southampton University.

This is in addition to the courses already provided catering for the handicapped, teachers, doctors and business users. There are almost 30 titles in all which continue until the end of August. Prices start at £132 for a week's teaching, and self catering accommodation at £25.

BBC micros and a wide range of peripherals are available on the courses. Programming is mainly in Basic, but other languages can be provided if there is sufficient demand.

Details from: Computer Holidays, 37 University Road, Southampton SO2 1TL.

Comms by phone

PACNET is an organisation backed by the Council for Education Technology, British Telecom and the Manpower Services Commission to promote audioconferencing communication by telephone on networks.

The group intends to support training courses in education and commerce. Details from: The Director, Plymouth Audioconferencing Network, Learning Resources Centre, Plymouth Polytechnic, Drake Circus Campus, Plymouth PL4 8AA.

CET facts

FACT sheets about micros in schools, information technology, copyright, teleconferencing and telesoftware are available from the Council for Educational Technology.

The CET also publishes several books on related subjects, including wordprocessing, geography with micros and electronic learning aids. Details from CET, 3 Devonshire Street, London W1N 2BA.

Easter games

THE Personal Computer Games Easter Show starts on Good Friday, April 20 at 10am and runs until the Sunday. It's plugged as 'the most exciting computer games event of the year' with a host of Radio 1 DJs adding to the fun. Adults beware, it's at the Solihull Conference Centre, Homer Road, Solihull, West Midlands.

1984: The launch year of the micro modem

TELEPHONE communications look set to become the boom area in computing during 1984. Competition, cheap hardware and a mushrooming in the number of accessible databases are all contributing to bring this Big Brother technology into our homes and offices.

In the past six months at least half-a-dozen companies have sprung up offering modems, while prices have plummeted to the £100-mark as a result of new chips to control the devices.

Databases such as Micronet and Viewfax on Prestel have woken users up to the potential, and many groups have set up their own 'bulletin boards' and electronic 'mailboxes'.

Bulletin boards allow users to dial in, using their micro and modem, and leave messages on a computer which stores the information so it can be looked at later by others. More sophisticated versions such as Micronet carry far more information, as well as news and advertising, and programs for users to 'downland' into their own machines. Fully fledged electronic mail systems such as Telecom Gold give access to worldwide networks and transmit data in seconds to await someone on the other side of the world (*Acorn User*, October 1982).

Large companies are setting up databases on their own systems for customers' use, and many can be searched from Prestel and Telecom Gold.

Prestel is about to re-organise its micro databases, and companies such as Acorn, as well as magazines, are providing mailbox facilities and information. These can be accessed in off-peak periods to avoid the major problem with communication – the price of a phone-call. However, we can expect to see pressure exerted on British Telecom within the next year to reduce costs – or even a special service being provided by one of BT's many new competitors.

The cheapest way to connect a micro to a telephone line is still via an acoustic coupler, similar to those provided by Prism for Micronet. However, these suffer from

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Above: The WS2000 modem from Minor Miracles costs £118 and features switchable baud rates to meet all standards.
Right: OEL's Telemod 2 modem (Prestel and 1200/1200 baud rates) is British Telecom approved. It costs £100.
Below: Grapevine from Pace is a versatile unit at £145. BBC micro lead comes as standard.



Tracking terminal software

MODEM users inundated Hans Doelemam when we mentioned his club – he had 183 replies!

Since then, Hans has had to send out photostated letters to everyone, requesting a blank 40-track disc and sae to get his free terminal software.

So, if you weren't one of the original 183, Hans is at Fuik 49, 1141CK, Monnickendam, The Netherlands.

Also, remember there's a similar group in Britain called Forum 80. The address is 421 Endike Lane, Hull HU6 8AG.

Database menu grows

SOFTWARE houses are leaping to the aid of BBC micro users who are crying out for a good database.

Silversoft, Clares and Haiku Software Technology have all laid their cards on the table to compete with Gemini's ROM version, announced in last month's issue.

Silversoft – with its first BBC product – is hanging its campaign on the fact that its Viewbase will work with Acornsoft's View wordprocessor.

Viewbase will carry up to 1500 records per 100k disc, and claims to sort at over 600 records per minute. It gives nine options: initialise file; enter, alter or delete records; print file definition; print labels; link to View.

Disc and manual cost £24.99, but the program has yet to be tried on a 6502 second processor. 'It should work', said a spokesman, 'but one is sometimes proved wrong. 'If it doesn't work, we will do our best to offer an update service'.

Clares' offering is also disc-based and costs £25. Beta Base can cater for more than 2000 records, 200 files, and fields of up to 254 bytes. It boasts flexible file size, simultaneous sorting and up to 500 sorts per minute.

Haiku chips in with Data Safe at £19.99 for disc or cassette-based BBC micros and Electrons. Simple to use but sophisticated is the company's description. The program gives variable record size and a menu structure.

Silversoft is at London House, 271 King St, London W6 9LZ. Clares is based at 98 Middlewich Rd, Rudheath, Northwich, Cheshire CW9 7DS.

The address for Haiku is Dragon Gate, 77 St John's St, Hayle, Cornwall.

How the west is being won

RADIO West's Datarama computer show can now be heard on two other stations.

The programme goes out weekly and lasts half an hour. It offers news, reviews and interviews, as well as broadcasting software, some of which is used as the basis of competitions.

Presenters Tim Lyons and Martin 'The General' Schimmer have now been joined by Ray Hammond, who provides a regular book slot.

Transmission times are Sunday at 5pm on Radio West; Monday at 7.30 on CBC and Sunday at 7pm on Wiltshire Radio.

Tycoons put to the test

TEACHING business techniques on the Torch and BBC micros is the aim of a range of software from Hama Systems.

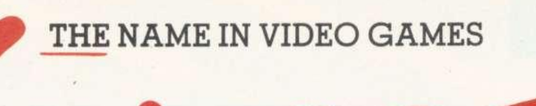
The company has written a series of computer-assisted programs, called Cal-Pax and Woodstock, a business game.

The units in Cal-Pax cover network analysis, stock control, business statistics, regression and correlation, and chi-squared testing. The packs are provided on two cassettes or a single disc. Prices range from £25 to £40.

Woodstock is a team game simulating the activities of a manufacturing company and its interactions with the outside world. Full sets of accounts are produced and information such as market shares and forecasting.

The game comes on a disc with industrial relations case studies, various forms, tutor's manual and 12 student's manuals. It costs £295 (plus VAT).

Hama is at 44 Magdalen St, Norwich NR3 1JE.



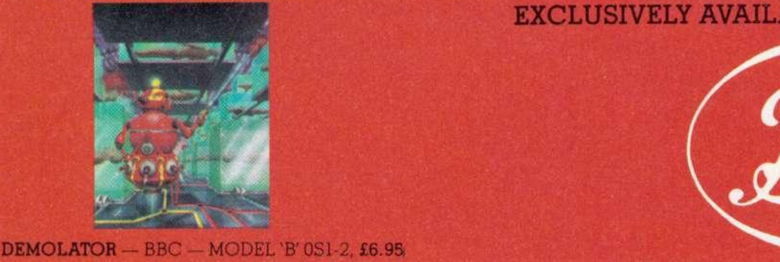
Visions

DEMOLATOR

Following the Thousand year war with the Alien Demolators the last remnants of the human race are being transported across the galaxy in cryogenic suspension aboard the B.S. Quinn (Battle Star). The Demolators however have invaded the cargo bay and it is your job to destroy the Demolators and to protect the human cargo. All you have to defend Humanity with is Xeno (popularly named "the Phobe") the ultimate Robot. You can control his movements on two planes and fire an ultrasonic Cannon to defend humanity with.

EXCLUSIVELY AVAILABLE FROM LARGER BRANCHES OF

Boots



(FOR A LIMITED PERIOD)

SOFTWARE CHART

TITLE	PUBLISHER	TAPE	DISC
1 (3) 747 Flight	Dr Soft	£8.95	£11.95
2 (1) Twin Kingdom Valley	Bug-Byte	£9.50	
3 (9) Snooker	Visions	£9.95	
4 (4) Hobbit	Melbourne	£14.95	
5 (13) Saloon Sally	Psion	£7.95	
6 (14) White Knight II	BBC Publications	£10.00	
7 (8) Space Shuttle	Microdeal	£8.00	£10.00
8 (16) Snapper*	Acornsoft	£9.95	
9 (19) Transistor's Revenge	SoftSpot	£7.95	
10(re) 737 Flight Simulator	Salamander	£9.95	
11(12) Killer Gorilla*	Program Power	£7.95	
12 (6) Zalaga	Aardvark	£6.90	
13(17) 3D Bomb Alley	Soft Invasion	£7.95	£11.95
14 (7) Hunchback	Superior Software	£7.95	£11.95
15 (–) Chess	Acornsoft	£9.95	
16 (–) Vu-File	Psion	£14.95	
17 (–) First Steps with the Mr Men	Mirrorsoft	£8.95	
18 (–) Colossal Adventure	Level 9	£9.90	
19(10) Felix in the Factory	Program Power	£7.95	
20 (–) Amazing Ollie	Stormsoft	£7.95	

*available on Electron re = re-entry

BUBBLING UNDER

Cylon Attack	A & F	Johnny Reb	MC Lothlorien
Philosopher's Quest	Acornsoft	Owzat	Virgin
Gorf	Dr Soft	Ogles	Games Machine
Wordwise	Computer Concepts	Vu-Calc	Psion

Compiled by RAM/Computer

REVOLUTION has taken place in this month's software chart: only one arcade game creeps into the top five and half the titles are 'serious' games – or even business software.

Can it be that the zappers have been zapped?

***Vu-File*, Psion's cassette database, has launched into the Top 20, with *Vu-Calc*, a spreadsheet program, bubbling. And what about *Wordwise*? £40-worth of wordprocessing chip creeping in!**

The quality of the two chess programs, *White Knight* and *Chess*, is well-rewarded, and home education gets a look in with *Mr Men*.

No less than three flight simulators appear; stiff competition for Acornsoft's new *Aviator*. And three adventures all holding their own.

Has the last Space Invader been obliterated? Has *Defender* been banished to a planetoid? Is this the start of a new adventure? Find out, next month.

Utility in mini format

THREE-inch software is on the move with **Clares** having just released five of its titles on the mini discs. *The Key* is a five-program utility for use with discs, including format, verify and backup facilities. The final two programs, Editor and Retrieve, allow a disc's contents to be edited directly to and from the disc and recover data you thought you had lost!

In the footsteps of *Replica*, *Replica II* provides an easy way to transfer cassette-based programs onto disc, even the longest adventures.

Beebsynth has defining envelopes licked. It allows you to define up to 16 envelopes, and, at the press of a key, turns the Beeb's keyboard into a musical synthisizer.

B-Base is a database program written specifically for discs. It has a maximum file size of 99k (40-track), and up to 200 fields may be specified. Clares can be contacted on (0606) 48511.

Jet Power Pack and *Ghouls* are two new arcade titles from **Micro Power** for the BBC B. Jack, in true Ford Prefect style, is an intergalactic hitch-hiker who must escape the clutches of the evil warlord Nogrob the Terrible. A creepy mansion is the setting for *Ghouls*, where ghosts and bouncing spiders are just two of the nasties to be avoided.

System Software of Sheffield has released four educational titles. *Easywrite* is aimed at the over-fours, to help develop the early stages of literacy. In a similar vein to Acornsoft's *Word Sequencing*, the package allows the child to select words from screen pages and build them into sentences. *Multitest* is a multi-lingual utility program for the writing, storage and examination of gap-filling type tests. Aimed at seniors, the program can test in English, French, German, Italian and Spanish.

O-level humanities, history and social studies are catered for by *Survival*. The program examines the roots of social organisation and development. *Stock* is an O and A-level package illustrating the working of a stock control system. Tel: (0742) 682321.

Fed-up with flying around in a 747? **Hewson Consultants** place you on the other side of the fence in the Heathrow air traffic controller's seat. The object is to land 10 aircraft within 30 minutes. Written by Mike Male, who sits in the real hot seat every day, the cassette comes with versions for BBC B and Electron.

DARK SCREEN

The Technology that puts NOVEX light years ahead

SCREEN GRAPHICS COURTESY OF A B DESIGNS

Display Distribution, who market probably the most comprehensive range of professional monitors, announce an astounding leap forward in monitor technology.

The revolutionary NOVEX D/S monitor combines superb resolution graphics, colour balance and image clarity which moves existing monitor technology into the past. NOVEX advanced technology doesn't stop there; just push the unique green switch and instantly convert your monitor to a D/S green monochrome monitor for programming and word-processing applications.

NOVEX monitors (recommended for use with the BBC Micro and approved by the 'Test Bureau' for education) are specifically designed with both RGB and PAL inputs to cater for the majority of small computers. The durable metal case (in BBC Micro colours) houses an internal speaker with independent volume control, together with carrying handles for greater safety when moving the monitor around.

The complete range of NOVEX monitors is available through your local micro dealer, and backed by Display Distribution's after sales support. Dealer enquiries welcome by contacting Charles Martin on 01-891 3668.



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A floppy tape plugs the gap

PHI MAG Systems has launched the Beeb's answer to Sinclair's microdrive. The Phloopy uses a cartridge offering 100k of rapid access storage to bridge the gap between cassettes and discs.

The cartridge consists of a continuous 12-foot loop of tape which slots into the Phloopy drive. The tape snakes to fill the space, only occasionally coming into contact with the cartridge wall. As no tape lubricant is used, the danger of fouling the read/write head is greatly reduced.

The transfer rate is 10k per second and the worse case for a file gives an access time of 10-11 seconds.

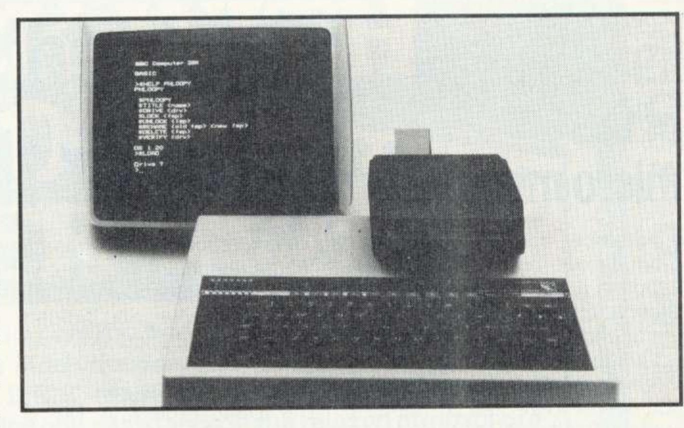
Data is stored on the Phloopy tape using a special 'byte-wide' head in nine-bit chunks across the tape, rather than serially as with cassettes. A built-in microprocessor ensures errors are spotted and corrected automatically.

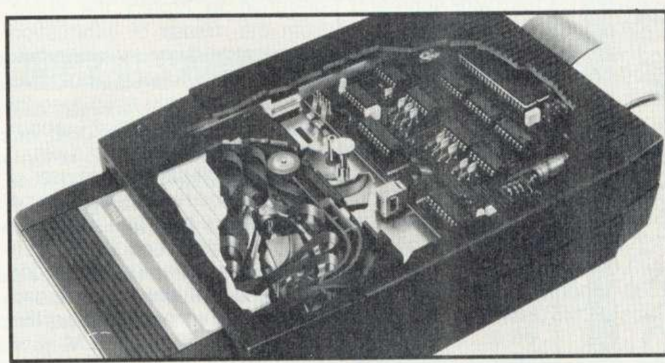
With the exception of OSGPBP, the Phloopy is fully compatible with all the MOS commands. A plug-in ROM provides the Phloopy loop filing system software, and adds eight new commands to the Beeb's vocabulary. PAGE is set to &1600, using 2k of RAM as opposed to the Acorn DFS's 2.75k.

The Phloopy drive is about the size of a slimline 5in disc drive and is connected to the Beeb via the disc port, with power being provided through the auxiliary power socket. An interface board (which allows up to eight Phloopy drives to be connected) consists of a 6821 PIA chip fitted into the 8721 disc controller socket. Fitting the interface also requires the cutting of two resistors.

The complete package including interface and manual will cost £143.75. Phi Mag anticipates the first production units being available by July, initially by mail order.

For further details, contact Phi Mag Systems, Tregoniggie Industrial Estate, Falmouth, Cornwall TR11 4RY. Tel: (0326) 76060.





The Phloopy drive gives a transfer rate of 10k per second, so the file at the end of the queue takes about 11 seconds to access (top). The cut-away picture shows the on-board microprocessor at the rear connected by ribbon cable to a nine-track recording head. The 12ft tape forms natural loops within the cartridge casing.

Acornsoft digs in with JCB package

ACORNSOFT has bloomed in the last month with several new releases.

The Mirle business software range of seven packs has appeared as well as several news games.

The games – *Aviator, JCB Digger, Crazy Tracer, Kingdom of Hamil, Free Fall* and *Carousel* – should now be available on cassette and disc, with the first two the subject of big 'theme' launches. The discs are produced so they can be read on 40 and 80-track drives.

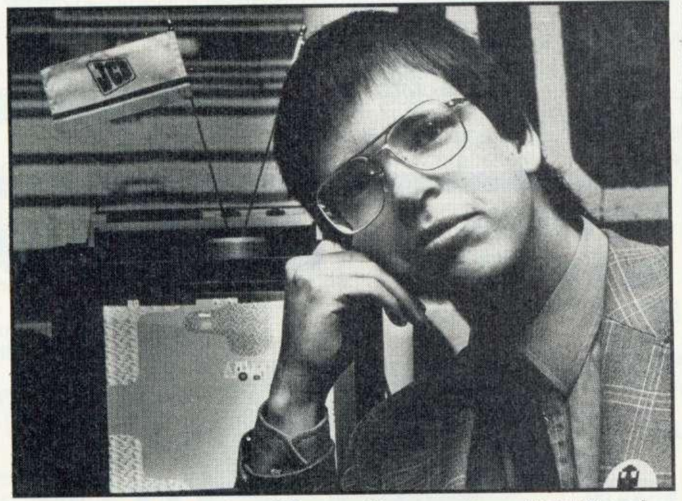
Cassettes cost £9.95 and the discs £14.50 (*Aviator* and *Kingdom of Hamil* are reviewed in this issue, *Free Fall* was covered last month).

Aviator, a Spitfire simulation, took off at the RAF Museum in Hendon, London, with Air Vice Marshall Sandy Johnstone standing in front of a real Spitfire to tell reporters it was just like the real thing.

JCB, which was sponsored by the renowned earthmoving company, dug its niche in the software world in Covent Garden, London. Acornsoft claims it is unique in being linked to a commercial product.

The business software, all disc-based, consists of accounts receivable, accounts payable, invoicing, purchasing, order processing, stock control and a mailing system. Each costs £24.95.

Five home education packs are set for release.



Jonathan Griffiths, author of Acornsoft's new release 'JCB Digger'

Bear upgrade

AN ENHANCED version of Acornsoft's *Wordpack* for the Atom is being released by Bear Hardware.

Called the Bearsoft Editor, the word processor is produced under licence from Acornsoft. It is based on the original *Wordpack* with several powerful additions, including repositioned buffer, text file starting at #3000, fast word-count.

The editor has been produced with the article and information writer in mind and is provisionally priced at £35 plus VAT.

Further information from Bear Hardware, 68 Harmondsworth Lane, Harmondsworth, Middlesex. Tel: 01-897 3059.

A load off your mind . . .

B-KWIK is a new cartridge system designed as a fool-proof way of loading software.

It uses the speech synthesis hole on the left of the Beeb's keyboard, where a socket is fitted for £30.

The ROM cartridges would add about £6 to the cost of a piece of software, but its designers feel this is offset by the instant loading, convenience and reliability.

Commscot, the maker, aims to upgrade machines in a few days, and the only disadvantage is that the voice synthesiser cannot be used. Details from Commscot at 30 Gordon Street, Glasgow G1 3PU. Tel: 041-226 4878.

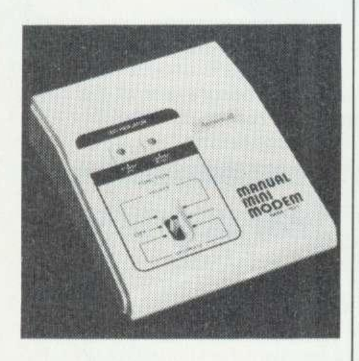
◀ page 9

1984: the year of the micro modem

interference caused by background noise and from ill-fitting handsets. Also, of course, the latest style phones won't fit at all. But at under £50, they have a big advantage for first-time users. Modems link the Beeb's RS423 port directly to the new BT phone sockets. This 'hard wire' approach cuts out the noise problem.

The main uses for modems or acoustic couplers are for transferring data between two micros; accessing Prestel-type databases; and linking into electronic mail systems (at present these are aimed at businesses and universities).

These possibilities are all offered by modems from OEL at £100, Minor Miracles at £118 and Pace at £145 (including VAT).



Answercall's Mini Modem

A cheaper modem, the Buzzbox, comes from Scicon at £99. The Buzzbox is also the neatest, literally pocket-sized, but cannot access Prestel as it can transfer data at only one speed: 1200 baud transmitting and receiving. Prestel uses 1200/75.

Answercall's 300band-only modem suffers the same drawback, but comes in at just £75.

Whether modems or couplers are used, terminal software is needed which sets up the RS423 for receiving and transmitting. These programs are available from some user groups, and are often supplied with the hardware. More sophisticated versions are available in EPROM from Pace (Commstar at £34) and Computer Concepts (Termi at £33.35).

OEL is on (0768) 66748; Prestel mailbox 093051909; Minor Miracles on (0473) 50304; Pace on (0274) 729306; Answercall on 01-659 1133; and Scicon on (0908) 565656.

'Cobbled' data Bill could hamper the hobbyists

DATA protection legislation is set to cause the biggest uproar in computing since micros first came to Britain. A Bill now going through Parliament could effect everyone handling data on computers – and that includes your BBC micro.

The Data Protection Bill is designed to protect the public from the misuse of information stored about them on computers. It does this by setting up a data protection register which people who hold information about others would have to pay to join.

Now, the Bill says a 'data user' is someone who holds data, and the definitions of data and users are so general that a computer club membership list or an index file held on disc might be construed as falling within the confines of the legislation.

Registered data users would have to answer questions from 'data subjects' who are concerned about the facts relating to them. The questions would be asked through the data registrar, who would have a staff of just 20 people. As Sir Norman Lindop, who proposed a central data processing authority in 1978, put it: '... the Bill is very vague about how that much-burdened person is going to operate.'

MPs of all parties have expressed dissatisfaction with the Bill, and there is concern that it was pulled together too quickly purely so that the UK could meet EEC legislation.

> **Data Protection [H.L.]**
>
> A
>
> BILL
>
> INTITULED
>
> An Act to regulate the use of automatically processed information relating to individuals and the provision of services in respect of such information.
>
> *Brought from the Lords 3 November 1983*

On a recent Radio 4 Checkpoint programme Tory MP Stephen Norris and Alliance member Paddy Ashdown both described the Bill as being 'cobbled together'. Their major concern was the lack of protection for individuals, as the police's and other national computers would not be subject to the same scrutiny as other data users.

Also, a data user is not a data user if the processing carried out is 'performed only for the purpose of preparing the text of documents.'

This appears to exempt word processing from the Bill. However, what about data which is received from another country, or a registered data user, through a telephone link and dumped to a printer or a word processor? Because once the data is on paper the Bill would not apply as it covers only information held on computer.

If someone downloads information from a database which is owned by someone else straight to a printer and then uses it in a paper form, is that person a data user? And once on paper, data can be abused as much as anyone wants.

The Bill is at the moment in its committee stage, having already been through the House of Lords. It is then due to go to the Commons just after Easter, and should be on the statute books before the summer recess.

There is no clause excluding home computers, but a Home Office spokesman was confident of one being put in at committee stage, even though there is no home computer lobby. 'The ordinary domestic user will in the end not be affected,' he said.

Where that line is drawn will no doubt keep our politicians busy for a while.

Third level for Econet

ECONET looks set to be relaunched by Acorn in September to coincide with the new school year.

The company is aware that the networking system has received some bad publicity in its level 1 form, which looked as if it had been patched together.

Several competitors have stepped in to fill the networking gap as schools awaited the long-delayed second processors to run the level 2 software. Latest of these is Broadway Electronics, which claims its system has almost all the improvements of level 2, costs less than £150 and doesn't need a second processor.

The company's Super Level One can support the Amcom DFS, which allows Winchester hard discs to be used. Broadway Electronics, is at Unit 3c, Aston Rd, Bedford.

Classics for Atoms

THE latest Atom catalogue list from Software Classics includes versions of *Frogger, Chess, Simon, SuperBasic,* and a machine code disassembler.

Among the 60 or so games cassettes on offer are 5k versions of *Frogger* at £6 with 'good graphics, sound and hi-score facility'; *Chess II* (£4), with six levels and an option to print out an analysis at endgame (Software Classics says 'Not as strong as *Chess* but still a challenging opponent'); and a text adventure called *Wizard's Den* (£4). *Ricochet,* also 5k, is a pinball game for two players 'in which strategy is everything' (£5); and *Simon* featuring flags of the nations (£4).

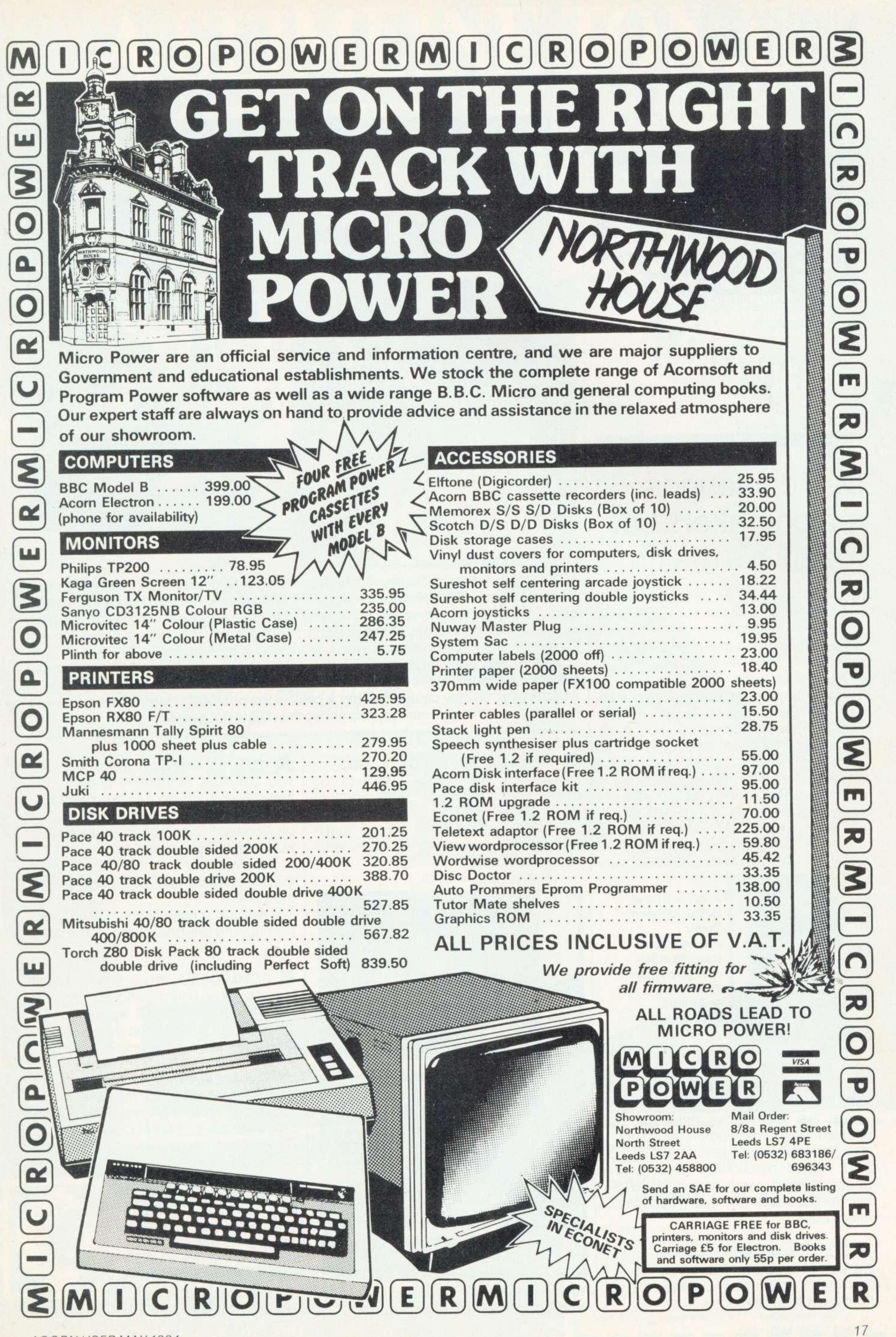
Added to multi-packs is a £5 twinning of *Persona* (a personality profile program) with *Biorhythms,* on which you can store the charts of family and friends (and presumably enemies). This costs £5.

Newcomers to SC's ROM-based products are *SuperBasic,* costing £12, a COS system with visible load/save features, several additional commands and facilities; and a machine-code disassembler (also £4) which displays hex and ASCII codes.

Software Classics, of 2 Connie Street, Openshaw, Manchester M11 2JD (061-223 3849), offers an EPROM blowing service at £7 per 4k EPROM, and markets a selection of programs in ROM form at £10 each.

All catalogue programs are available on disc at £3 extra.

Projects currently being evaluated include a 16-bit machine code interpreter and an extended MOS for the BBC Basic board.


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Acorn Disk interface (Free 1.2 ROM if req.) 97.00
Pace disk interface kit 95.00
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ACORN ABUSER'S Diary



JCB Digger – one of Acornsoft's latest – has got to go down as one of the more unusual launches in software history. JCB, who sponsored the program, provided one of their earthmovers, which proceeded to do mechanical acrobatics. Then, as our picture shows, it appeared to get a parking ticket in London's sunny Covent Garden. But, we can reveal, it was a stunt set up by Acornsoft's PR men, Robert 'Bertie' Blood and Stephen 'Skip' Palmer from Quentin Bell. WPC 489 Joanna Harvey – a Bow St Runner no less – actually gave the QBs not a ticket, but her name and address so they could send her a copy of the photo! The furry characters were life-size versions of 'meanies' who chase the JCB in the game.

DJD confounds matchmakers but meets his match

WE ARE glad to be able to end all speculation about Acornsoft boss David Johnson-Davis. Rumours were rife after his astounding compatibility ratings with the young ladies at his company's launch of *The Dating Game*.

This unusual piece of software, written by Ivan Berg, was reviewed in our February issue, and enables couples, or business partners, to assess their compatibility by answering a simple list of questions (great for parties!).

Keen questions were asked, but no answers given, about young DJD's Valentine card count. Then further fuel was added when a picture was rumoured to show DJD holding hands with an Ivan Berg employee – and only a BBC micro between them as chaperone.



Acornsoft boss David Johnson-Davis proved a great success at his own game. But all was not as it might have seemed

Is he Mr Perfect? the tongue-waggers asked?

Well, we reckon the answer is he cheated! *The Dating Game* is based upon standard personality tests – and DJD's PhD was in psychology. Also, he's a happily married man, having signed away his freedom just this year. Congratulations DJD!

■ SOFT, the software magazine, took a dig at *Acorn User* over February's 'Protection Racket' article in its April issue. But we fixed them. It was their last!

■ THE list of Acorn's sponsorships, it seems, is ever growing. We've had the Chess Championships and Formula Three racing, and now it's the London Computer Festival, a Cambridge rugby competition, and British tennis hopeful Teresa Catlin.

Whatever next – the QL?





Young tennis star Teresa Catlin and speedy David Hunt: Acorn hopefuls

■ QUINKEY'S advert in last month's AU had the lads at Acorn's London HQ thinking an April Fool had been pulled.

They'd never heard of *Spooky Manor* by Acornsoft, and Vector seemed unaware of any distribution deal.

However, our intrepid Editor went round to Microwriter and actually played the game.

It was just a case of one half of Acorn not knowing what the other half was up to.

■ COMMANDER Bruce Smith, one of our writers, has been having a disappointing time lately. He's still waiting for his promised Electron: 'I hope we will be able to let you have a prototype in May 1983', said Hermann Hauser, 14 months ago.

But the latest tragedy was his book *Interfacing Projects for the BBC Micro*, published by Addison-Wesley. 'You'll get a copy next week,' said AW. But he didn't. The reason: the lorry carrying the first print run to London was hijacked.

■ VISIONS, the software house, had never sent us a review copy of any of its tapes until this month. Then *Digger* arrived. Great, we thought and opened the packet. But, 'twas not to be – the cassette box was empty. Perhaps the whole lot was a mirage.



A SLIMLINE TONIC FOR THE BBC MICRO
Cumana 5¼ inch slimline dual disk drives for the BBC Micro are now available from well known high street outlets, including W. H. Smith, John Lewis and Spectrum UK, as well as from Cumana's national dealer network.
The dual drives are available in two versions, as shown, including a 'switchable'. This version enables either drive to be switched independently between 40 and 80 track modes.
Each unit has an independent power supply, 12 months warranty, and is fully assembled and tested before packaging. A drive connecting cable, user manual, formatting diskette, power supply lead and plug are all supplied complete with the disk drives.
Look out for the distinctive Cumana packaging in your high street, today!
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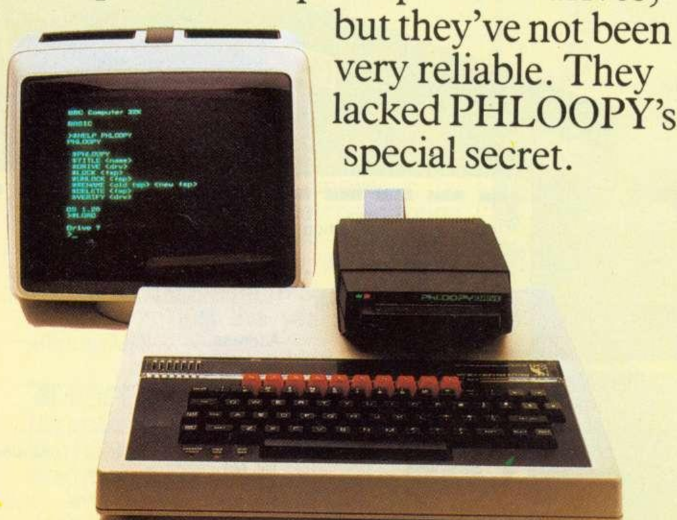
EUREK

A 100k BBC-drive for £99 + VAT

We've done it! We've built a mass storage system for your BBC Micro with the power and convenience of a floppy disk drive, but at a fraction the price. Get to know PHLOOPY, the remarkable new 100k drive that costs only £99 plus VAT, and a further £26 plus VAT for the interface to your BBC, operating system and connecting cables.

How PHLOOPY does it

PHLOOPY does not use disks to store data, but a 12-foot loop of professional-quality quarter-inch magnetic tape contained in a robust cartridge. The drive has only one moving part, the motor which drives the tape loop – hence the low price and high reliability. As the loop is driven round, each file of data it contains passes across the magnetic head which reads it or writes to it. Other people have produced tape loop micro-drives, but they've not been very reliable. They lacked PHLOOPY's special secret.



PHLOOPY's special secret

The heart of the invention is a brilliantly designed "byte-wide" magnetic head, made by Phi Magnetronics who build multi-track heads for professional use. PHLOOPY's head records and reads nine tracks across the width of a quarter-inch tape. That means the tape loop can be much shorter, so the typical time to access a file is reduced to a mere 3 seconds. If you're used to waiting for a cassette tape to trundle programs into your BBC, you'll be amazed at PHLOOPY's performance.

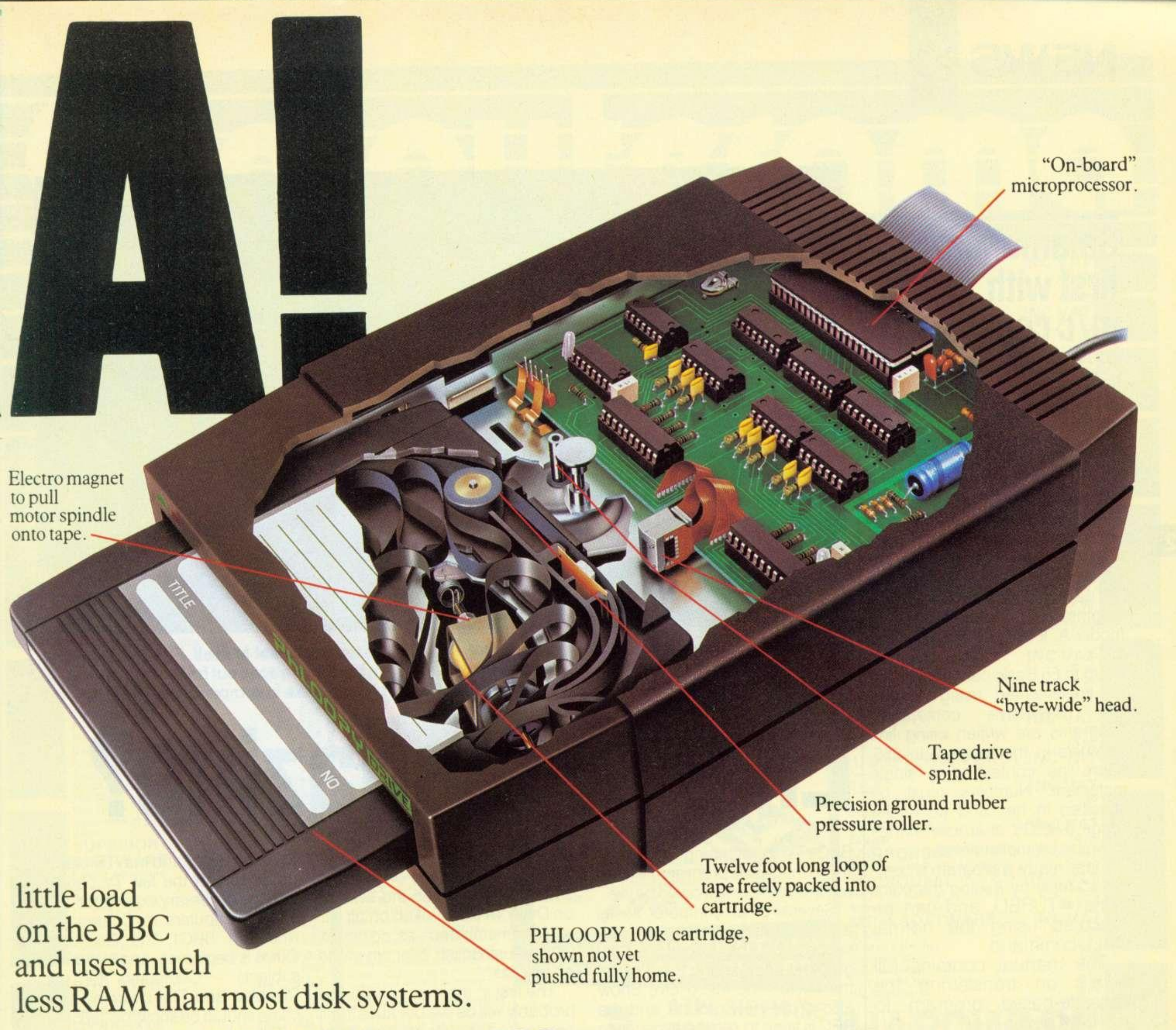
Getting it right every time

In addition, we've included a feature we know you will appreciate. PHLOOPY has full error detection and correction, so you can be certain you will get back what was originally written onto the tape.

Talking to your PHLOOPY

PHLOOPY's own software, contained in ROM, responds to standard BBC filing system and Basic commands. Most programs written to run on disk or cassette should run on PHLOOPY without problem.

And because PHLOOPY contains its own intelligent microprocessor – a second computer which does most of the hard work – PHLOOPY puts very



little load on the BBC and uses much less RAM than most disk systems.

Installing PHLOOPY on your BBC

You'll be amazed how simple it is to install PHLOOPY. Just plug in the interface cut two resistors (clearly marked in the instructions) and the job is done. If you should have problems our engineers are waiting to help you.

Making a PHLOOPY Library

PHLOOPY cartridges hold a full 100k of data or programs. Two of them come free with the drive and extra ones cost £3.75 each plus VAT. They are moulded of high impact polymers for protection and store easily on a bookshelf. Many programs will be available to purchase on PHLOOPY.

Phi Mag Systems Ltd.
PO Box 21, Falmouth,
Cornwall TR11 3TD.
Telephone: (0326) 76040.

Order Form

- Please send me further details about the PHLOOPY 100k data storage system for the BBC Model B.
- Please send me________(qty) PHLOOPY starter pack(s) for my BBC Model B microcomputer, including PHLOOPY drive, BBC interface, leads, connections, operating system in firmware, manual, and two PHLOOPY 100k cartridges, at £147.75 each including VAT, postage and packing.
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AU

Salamander first with m/c compiler

THE first machine code compiler for the BBC micro (OS1.0 onwards) and Electron is now available.

Turbo Compiler is produced by Salamander Software and can instantly transfer a Basic program into standard 6502 machine code that is completely independent of Turbo itself and so can be used without the compiler being present.

The compiler is a mere 2k in length and will therefore run on a model A. It cost £9.95 (including VAT).

Up to 65 Basic commands can be implemented using *Turbo*'s own Basic-style commands. Programs are written using line numbers in the range 0 to 255, each line containing a single statement. Numbers must be specified in hex and be in the range 0-65535; character strings may also be implemented.

Once ready, a program is compiled simply by issuing the command *TURBO, and can be executed using the normal CALL command.

The manual contains full details on transferring the cassette-based program to run from disc.

For further details contact Salamander at 17 Norfolk Road, Brighton, East Sussex, BN1 3AA.



The opening sequence to Computers in Control was a major technical feat in itself. First, an industrial robot had to be programmed to write the title in mid-air. Then, the line it traced out had to be drawn in on each film frame – just like cartooning. Adding the rest was a piece of cake in comparison!

Live TV magazine?

BBC TV is planning a 'regular micro magazine programme to go out this year – and it could be live.

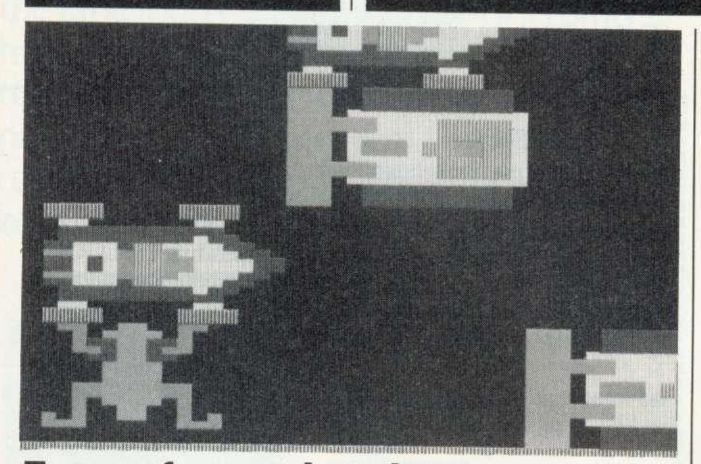
Several other computer series are in the offing, all thanks to the success of The Computer Programme and Making the Most of the Micro. The Micro Live Show also broke new ground and the BBC is keen to see the experience gained put to good use.

However, there are enormous problems and costs involved in a live show, and the television producers have yet to make up their minds. The incident on the live show last year when the security on Dialcom was broken on air will still be remembered – as, no doubt, will the fuss British Telecom made afterwards.

The first in the magazine series probably will be live because it will be used to announce the results of the BBC software competition for schools. Patrick Titley, who directed Micro Live, has just finished a secondment to the Great Egg Race on BBC2 and may be called up as one of the few TV people with the necessary experience.

As Computers in Control finishes on BBC1, the Electronic Office is beginning, and two more subjects – Computers for the Disabled and The Learning Machine should be shown in 1985.

Other topics such as graphics and programming may be covered by one-off specials or in mini-series, although the format has still to be thrashed out.



Freeze frames in colour

A SCREEN printing service is offered by Dimension graphics. For £4 the company will print a copy of a game screen in eight colours to a size of 320 x 256mm.

Dimension can 'freeze' a BBC or Electron game at any point – although the company doesn't guarantee to get any high scores.

Cassettes or 40/80 track discs are acceptable, and turn round time should be 48 hours.

Discounts on multiple orders and other print sizes are available. Details from Dimension Graphics, Lamport, Stowe, Bucks.

Data breakthrough claimed for Beeb

A DATABASE for the Beeb called Micro PSS is claimed to mimic the capabilities of SPSS – one of the most widely used pieces of software in universities.

SPSS is run on mainframe computers. It was originally developed in the United States and written in Fortran. The full name is Statistical Package for Social Sciences.

Micro PSS is disc-based and its features include the following:

- tabulations
- up to five files open at once
- virtually unlimited storage capacity per file
- multiple records
- searches for combinations of up to 15 fields

In other words, it's SPSS without any of the maths or statistics.

The author is 'hoping to make a bomb', but is wary of falling victim to software pirates, especially in overseas markets, and so is looking for a major company to help market the product.

The company marketing the program claims it has now been in use for over six months with three local authorities.'

Details of the Micro PSS are available from The Educational Software Company, 108 Parthenon Drive, Liverpool L11 7AQ.

The company will arrange demonstrations, but is unwilling to send out review copies until disc protection is sorted out.

Computerama

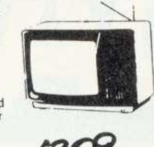
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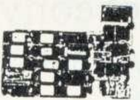


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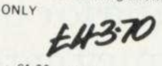
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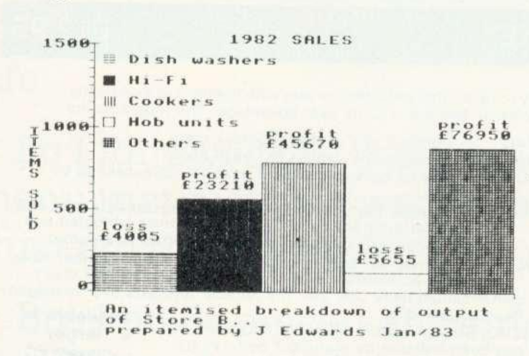
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	Income	257
	Expenses	101
	Net Profit	**720**

% Gain = 36

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Transactions per holding	16	16
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File Manager	YES	NO
Printer Manager	YES	NO
REPORTS PRODUCED:-		
Portfolio Valuation	YES	YES
Portfolio Profit Analysis	YES	YES
Share Profit Analysis	YES	YES
Share Movement Analysis	YES	YES
Transaction Record Report	YES	NO
File Status Report	YES	NO
GRAPHICS FACILITIES:-		
Magnification option	YES	YES
Grid	YES	YES
Autoscale	YES	YES
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Screendump (see below)	YES	YES
SELECTABLE GRAPHICAL INDICATORS:-		
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Centred Moving Average	YES	YES
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CAD WITHIN YOUR GRASP

Bitstik flair is ideal use for 6502 second processor power, says Robin Mudge

THE impact computer graphics has made on art and design over the last couple of years is easy to see. We are surrounded by images produced on sophisticated computer paint boxes, special-effects generators, business graphics and computer-aided design (CAD) systems of all shapes and sizes. The trouble is that their cost – between £20,000 and £500,000 – has put them way beyond the reach of individuals and businesses itching to have a go. Now Acorn has launched the Bitstik graphics system, which puts easy-to-use, professional computer-aided design within reach of these people.

The Bitstik package itself costs £375, but it needs a dual 80-track disc drive and a 6502 second processor (reviewed on page 39) as well as the BBC model B and a colour monitor. Starting from scratch, this mounts up to about £2000.

The Bitstik is really a word processor for pictures. The user can draw pictures in a variety of line types and styles in four colours and use automatic circle, arc and curve drawing. The picture can be painted from a choice of 16 colours at a time and stored in a unique filing system. Images can be changed at will, duplicated in any orientation, distorted and moved around. For accurate diagrams, there is a range of precision aids. The user can zoom in on a drawing to reveal detail and pan all over the image. Text can be added in any size and orientation.

The Bitstik was originally designed by Robocom for the Apple II computer about two years ago. Acorn then commissioned Robocom to write a version for the BBC micro, taking into account its enhanced graphics features. The package is based around a precision three-axis joystick giving control in the x and y axis and, by rotation of the knob, the z axis. This, combined with three buttons on the body of the joystick, gives almost complete control through a series of screen-based menus with minimum use of the micro's keyboard. The software is contained in a ROM installed in one of the sideways sockets within the Beeb. The system master utilities are supplied on an 80-track disc, and a second disc acts as a drawing buffer.

The system is started by simultaneously pressing the shift and break keys (auto-booting). An initial menu appears that offers a number of utilities and starts the system running. Once loaded, a menu appears down the right-hand edge of the screen, along

with a line of items at the bottom called the 'draw palette'. The main area of the screen is the work page and shows a multiplication sign and addition sign connected by a white line, to represent the origin and dynamic cursors.

The origin cursor marks the start position of a line. Moving the Bitstik joystick in the x and y axis makes the dynamic cursor move about. The white line between the two cursors stretches and contracts like a rubber band (it's called the rubber-band cursor) and shows where a line would be drawn.

All the system's major functions are selected using the controller to position the dynamic cursor over items in the menu or palette. The selection is confirmed by pressing a combination of the three joystick buttons. The top left one is the red action button. When pressed it usually results in something happening, such as a line being drawn. The bottom left button normally confirms a selection and the bottom right button provides a release function from certain operating conditions.

The controller is slightly biased toward right-handed users. It sits comfortably in the left hand, freeing the right to control the joystick while the left makes confirmatory selections with the three buttons. This makes the system remarkably easy to use and is a real boon to people confused by computer keyboards.

The draw palette contains four groups of items: LINE SHAPE, NIB, COLOUR and LINE TYPE, each denoted by a simple symbol. In the colour block are four small rectangles, each filled with one of the four basic colours (the system runs in mode 1). These are white, red, yellow and black, but they can be reset to any of the 16 available on the BBC micro (eight if the flashing colours are ignored). The default drawing colour is white, but the dynamic cursor allows one of the others to be selected. A small white triangle appears above the selected colour accompanied by a short beep. The beep helps avoid selecting options by accident when working close to the palette or menus.

Next, there are four different line shapes, each selectable as for the line colour. By default the system draws straight lines. The dynamic cursor can be moved anywhere on the work page and when the red button is pressed a line is drawn in the position of the rubber-band cursor and in the selected colour.

The second line shape is the TANGENT ARC. This is used to draw the arc of a circle, having been given a starting direction and an end-point.

The third line shape is another arc drawing function, COMPASS ARC, which mimics the use of an ordinary pair of compasses and allows the centre-point, radius and radius length to be set at will. This line shape is difficult to get used to, but very useful.

The fourth shape, CIRCLES, allows complete circles to be drawn. When selected the cursor changes to a circle: x and y movement of the joystick positions the circle on the work page and the diameter is altered by twisting the joystick knob.

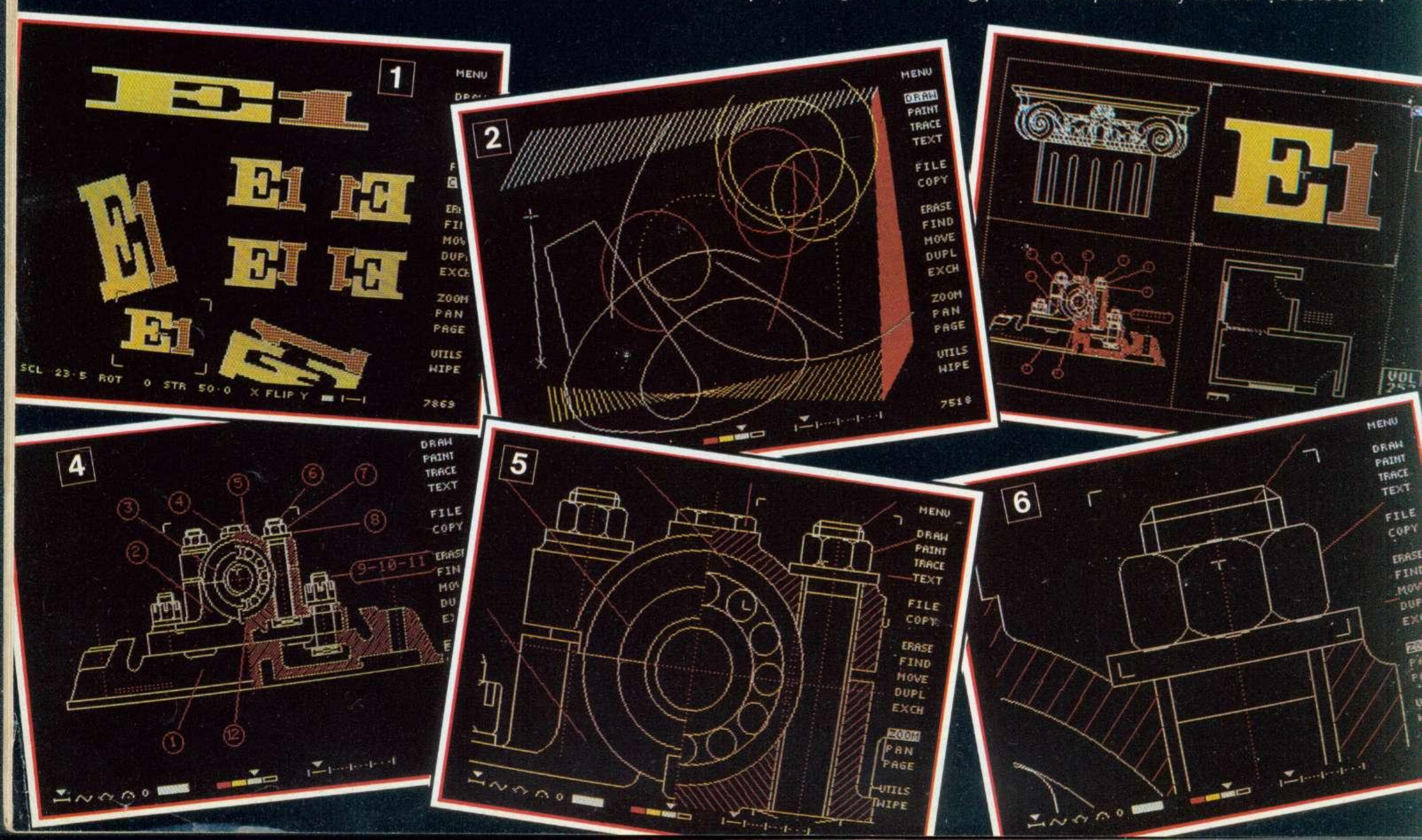
The NIB function allows the user to draw lines of variable width. It replaces the origin and dynamic cursors by two nib cursors, the area between which is filled when the action button is pressed. The system sets the nib to solid fill but by selecting the nib function with the dynamic cursor and twisting the z control, one of six different nib spacings can be set to give hatching and tone effects.

The final group of items in the draw palette set the line type. There are four of these, offering continuous lines and three types of dotted line. The system draws straight lines to an accuracy of 0.001mm and curves and circles to 1 minute of arc!

Menu functions are selected in a similar way to the palette, using the dynamic cursor. If a mistake is made during a drawing session an ERASE function can be used to tidy up a drawing, and the holes this seems to leave can be removed by PAGE. This clears the work page and redraws the image complete. The complete drawing can be erased using the WIPE function. When this is selected, both the left and action buttons must be pressed together for safety.

The finished picture can be coloured in with ease. When 'painting', the drawing palette is replaced by a set of 16 colours

Screen shots from Bitstik system. 1. Manipulation and distortion of any image is possible, in this case of the lettering in picture 9. Menu at bottom gives information on distortion. 2. Arty doodles at your fingertips. Base menu shows colour and drawing mode chosen. 3. Disc menu. Top right image has been chosen for copying. Note change in menu. 4, 5, 6. Zoom, zoom, zoom. Level of detail in image held is virtually unlimited.



made from mixtures of the four basic colours. Colours are chosen by touching them with the single paint cursor, again a small white triangle indicating the selected colour. When the paint cursor is in the area to be painted, pressing the action button causes the area to be filled with colour at an astonishing speed. Even the most complex irregular shapes pose no difficulty to the paint routine. Care has to be taken, though, to ensure there are no holes around the perimeter of the painted area or else the colour leeks out and fills the entire work page.

The basic colour palette can be set up with any four of the 16 BBC colours, but this is a lengthy business involving changing discs and restarting the whole system. It may seem from this that the colour range is wide – indeed it does extend the range and type of colours offered by the BBC micro – but in practice the colour range is not particularly versatile. For example, it is not possible to mix black with any of the 16 Bitstik-derived colours to aid shading – but then this is a CAD system and not a cheap replacement for computer paint boxes, so the criticism might be a little unfair.

The most remarkable facility allows detailed drawings to be made with far greater resolution than that offered by the computer itself. The user can zoom into selected parts of the drawing and add more and more detail. When this function is selected from the menu, a rectangular cursor is presented on the work page, the size of which is altered by the z control. When the piece of drawing to be enlarged is framed by the cursor, pressing the action button causes the contents of the cursor to be redrawn at the full size of the work page and at the full resolution of the system. More detail can then be drawn in and the zoom reversed or another zoom view given. The zoom range is astronomical, in fact 1 to 2^{120}.

When working on a zoom view the user can pan up, down, left and right over the image. After adding detail and returning the image to its normal size the software filters out information that is too small to show, but the information is still there and can be revealed by zooming in again. The software stores all the data needed to produce a drawing in a specially compacted way which means even the most complex drawings use very little memory. An indicator at the bottom right of the work page constantly shows how much memory remains. An audible warning is given when memory is getting low, and when this happens a procedure stores the current drawing and releases memory ready to continue.

When the drawing is finished and needs to be saved for later viewing yet another unique facility comes into action. Selecting FILE from the menu causes the work page to be temporarily stored on a buffer disc, which is replaced by a page containing either four or 16 rectangles, some of them able to contain miniature pictures. A cursor selects an empty rectangle and pressing the action button causes a miniature version of the drawing to appear in it. A label is added and the procedure is complete.

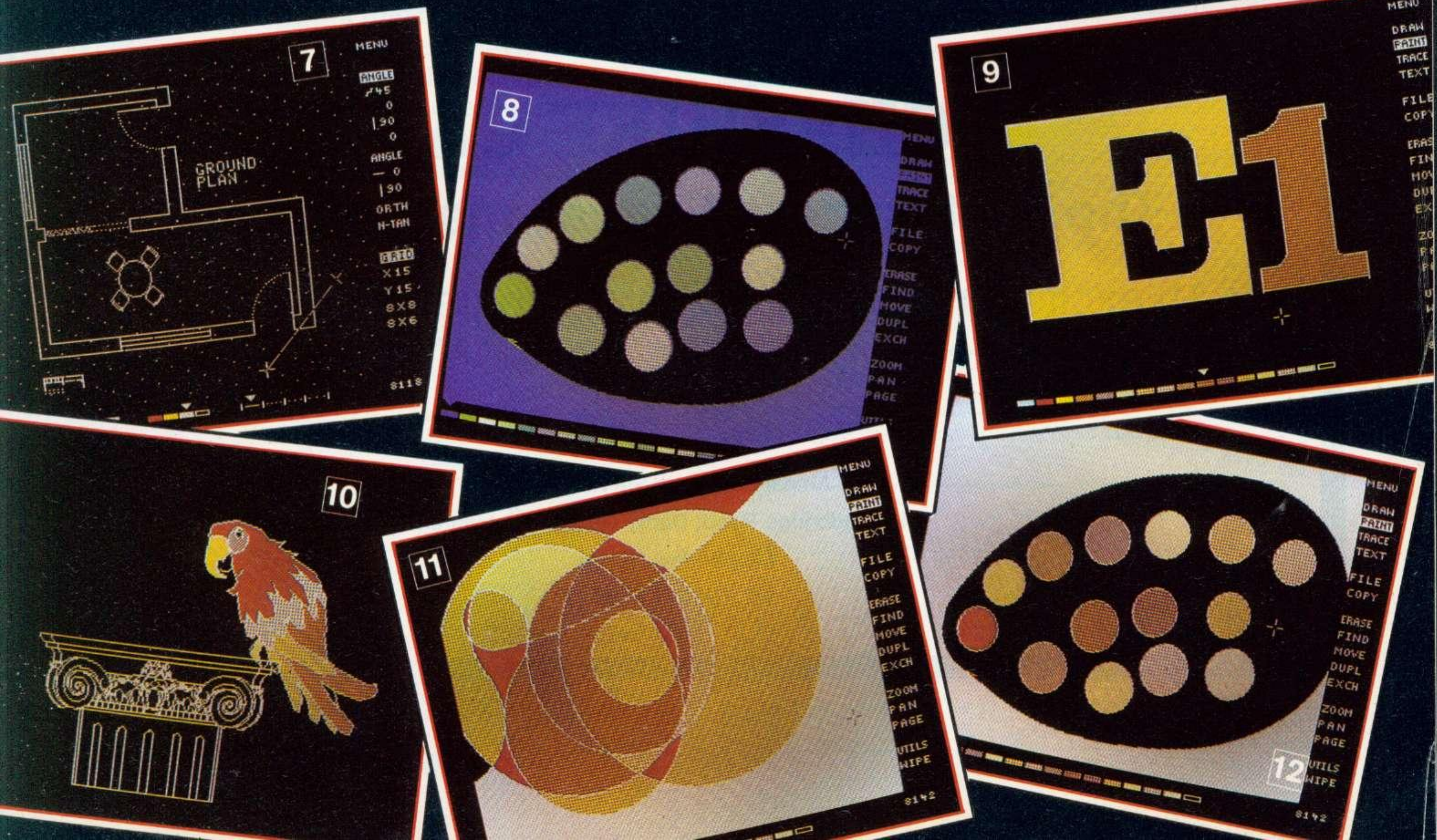
The library disc supplied is like an electronic version of Letraset, containing several predrawn images with three pages to each disc. A library picture can be repeated in any position over and over again, it can be rotated through 360 degrees, squashed and stretched. The palette gives information about the image scale, angle of rotation and degree of distortion. There is also a facility to reverse the image in the x and y planes or both, enabling instant mirror images to be created. Separate components of a complete image can be prepared, stored in the library and copied onto the master drawing using this facility.

At this point the similarity between the Bitstik and a word processor begins to emerge. Components from the library can be exchanged with existing ones on the drawing, wrongly placed ones can be found and moved or erased and pieces can be copied and duplicated in any position.

For accurate drawings a second menu is available on the drawing page. This offers facilities for creating grids with

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7. View of house plan. Note use of the grid with special menu, and of standard, Letraset-style, objects such as tables, etc, which can be created and manipulated. 8, 12. Two palettes of colours. Any combination of the 16 (eight flashing) BBC micro colours can be chosen, or mixtures of them. These palettes are used for painting. 9. An image can be digitised, and manipulated or distorted, as in picture 1. 10. A full screen shot of Robocom's parrot sitting on a Corinthian column. The normal screen menus have been removed and the image enlarged.



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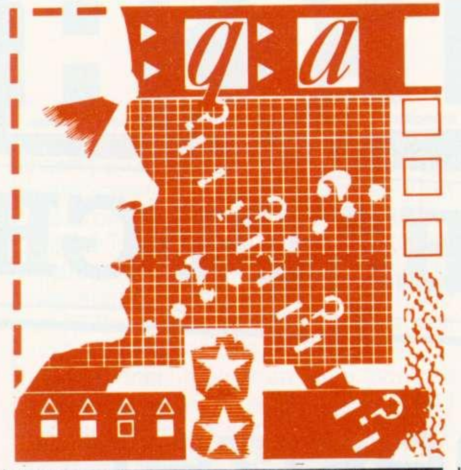
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Advice from Martin Phillips on the simpler aspects of the Beeb and Electron this month covers monitors, menus and printers

The monitor link

MANY people think the term visual display unit (usually abbreviated to VDU) applies only to monitors, but it can be applied to both a television set and a monitor and it really refers to any screen connected to a computer to display its output.

The BBC micro and the Electron have three sockets to connect to different types of VDUs: The UHF socket, the composite video and the RGB socket – all very confusing. There is an equally bewildering set of leads and plugs to connect each one up (diagram 1).

The UHF socket is a phono socket, and a phono-to-coaxial lead is supplied with the computer to connect it to the aerial socket of a domestic television. The RGB socket is a six-pin DIN socket to link the computer to the six-pin DIN RGB socket of a colour monitor (although some colour monitors use an eight-pin rectangular plug). The Electron's composite video socket is a phono socket, the BBC's is a BNC socket.

Monochrome monitors have a composite video socket, usually phono.

What is the difference between a monitor and a television? In simple terms a monitor is a television without the tuner part and usually without a speaker. There are two types of input to a colour monitor: RGB and composite video. RGB refers to the three colour signals (red, green and blue) that are fed to the monitor. These colours can be combined and sent as one signal – a composite video signal. A composite video signal can also be black-and-white, and indeed the composite output signal from the BBC micro is monochrome. Some of the televisions now on the market are also fitted with a composite video or an RGB socket to suit computers and videos and so can achieve the picture quality of a monitor.

Most of the leads shown in diagram 1 are available from computer shops and electrical shops that sell video equipment. The only one that could prove elusive is the RGB lead, but these are usually available by mail order. The RGB lead is also the most delicate and the connections are apt to break, in which event the effects are soon noticed: the printing on the monitor screen usually appears in a different colour from normal. This indicates that one of the connections in the plugs has come adrift. The plugs are wired pin-to-pin – eg, pin 1 to pin 1, pin 2 to pin 2.

The newer BBCs (issue 4 boards onwards) can be made to give colour out of the composite video by soldering across link S39 on the circuit board near the video socket; link 39 consists simply of two solder pads on the circuit board surrounded by a white rectangle. You can also fit a switch across S39 to give a colour switch. The issue number of the board is clearly printed on the circuit board near the middle of the computer. Some odd results can occur on a monochrome monitor with this link soldered (January issue, page 171).

If the BBC is being used for demonstration work it is often useful to be able to connect more than one monitor to the computer. A good combination is a 14-inch monitor for the speaker's use and two 20-inch monitors for the audience. The BBC will drive all three at once, with only a little blurring on the screen.

To achieve this I made a passive splitter box as shown in diagram 2. It is constructed from a plastic box with a metal lid into which I fitted two six-pin DIN sockets. The two sockets are wired together, and two free six-pin plugs with half a metre of wire each are wired to these sockets. The connections are easy. Simply wire pin 1 to pin 1, pin 2 to pin 2 and so on. There is no need to wire the central pin, pin 6. The pin numbers are usually printed on the solder side of the plugs and sockets, so little can go wrong, although the numbers are sometimes difficult to read. To complete the system I used one of the one-metre leads supplied with the monitors and made two leads each five metres long. One of these leads was fitted with two six-pin plugs, and the other with a six-pin plug at one end and a six-pin free socket at the other. This gives a flexible system to allow plenty of scope for positioning the monitors.

The four-core cable is the problem. Much of it that is readily available has a very fine wire gauge and soon breaks internally in use. Look for cable with each

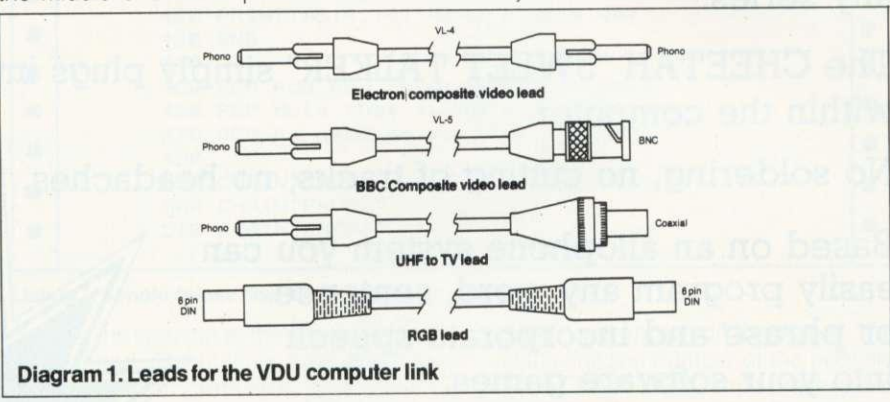


Diagram 1. Leads for the VDU computer link

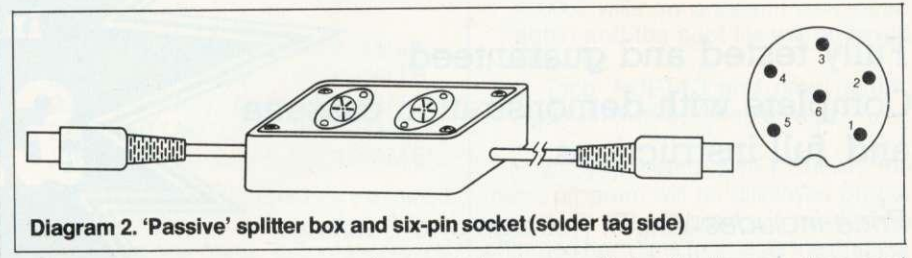


Diagram 2. 'Passive' splitter box and six-pin socket (solder tag side)

IF YOU have a technical hitch or a programming problem let Martin Phillips give his diagnosis. We'll pay £5 if you raise a really interesting point. Please give full details of the system you're using and include a listing where appropriate, making your question as specific as possible. WRITE TO: Hints & Tips, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

core at least 7/.02. Radiospares and Farnell's sell suitable cable in 25-metre reels. Screened cable is not necessary but it is stronger. The lengths of the leads are critical. The maximum length of lead is 12 metres – any longer than this it starts to degrade the signal noticeably. I have used an RGB splitter like this for some time with no ill effects to the computer.

To connect more than three monitors or to have longer lead-lengths would require an active splitter box, one with amplifiers built in to boost the signal.

Double-sided menu

SEVERAL disc menu programs have appeared recently to enable easy selection of programs on a disc. Mr Dodridge of Chester has sent in a simple-to-use disc menu program that has several advantages (listing 1). First, it enables a brief description of the program to be displayed. Second, it allows for programs that need to be *RUN or *LOADed, and, third, it can easily cope with calling side two of a double-sided disc.

The menu is in mode 4 with yellow lettering on a blue background. The colouring can easily be changed by altering lines 50 and 60. The disc title needs to be entered in line 110. The program descriptions can be entered in lines 220 to 350, and the corresponding disc program title added from line 490. *RUN and *LOAD can be used in place of CHAIN if the program so dictates. The line numbers must be in multiples of 10s to ensure that line 390, a computed GOTO, works correctly. Computed GOTOs are frequently shunned because they can cause problems if the program is renumbered, for the computed GOTO is not, and they make the program less easy to follow. However, in a short program such as this, the latter does not apply and there should be little need to renumber the program.

Notice the MODE 7 statement in line 390. By changing back to mode 7 before the new program loads, we ensure that there's enough room in memory for a long program to load. Another idea that could be implemented is a page change before loading a new program. If a program is too long to run on a disc machine, it is possible to include a page change before chaining the next program:

490 PAGE = &1100: CHAIN"PROG1"

This releases extra memory for the program and is often an easier way than having to load the program and then move it all down in memory. However, moving down in memory is the only real solution for a very long program.

If more than 14 files are required, the double-line spacing of the display can be abandoned. By putting new alternate lines into the program up to 28 programs can be listed, eg:

```
220 PRINTTAB (2,3) "1. PROGRAM A"
225 PRINTTAB (2,4) "2. PROGRAM B"
230 PRINTTAB (2,5) "3. PROGRAM C"
235 PRINTTAB (2,6) "4. PROGRAM D"
240 PRINTTAB (2,7) "5. PROGRAM E"
```

Do not renumber, for reasons explained above!

To select the menu automatically on side two of the disc, insert the following lines:

```
350 PRINTTAB (2,29) "14. Side two"

620 *DRIVE2
620 CHAIN"MENU"
```

If using 28 files, alter the line numbers accordingly.

To get the menu to start up when SHIFT and BREAK are pressed together, a boot file needs to be created. This is done by taking the following steps.

1. Insert the disc in the drive that requires the boot file.
2. Type *BUILD !BOOT and press return.
3. 0001 will appear on the screen. This is the first line number of the boot file. Type CHAIN"MENU" and press return.
4. 0002 will now appear. Press return again and the boot file will be saved onto disc.
5. Type *OPT4,3 and press return. Again, this will be saved on disc.

Now by pressing SHIFT-BREAK the menu program will be displayed on the screen. As this program will need to be changed from time to time as the number of programs on the disc increases, it is better to include the REM statements as a permanent reminder of where to put the titles and descriptions.

```
10 REM Listing 1
20 ON ERROR GOTO 400
30 MODE4
40 VDU23;8202;0;0;0;
50 VDU19,1,4;0;
60 VDU19,0,3;0;
70 COLOUR 131
80 CLS
90
100 REM Enter title of disc here
110 word$= "My Collection 1"
120
130 X=(40-LEN(word$))/2
140 COLOUR 130
150 PRINTTAB(X,1) word$
160 COLOUR 131
170 COLOUR 2
180
190 REM Enter program descriptions
200 REM here.
210
220 PRINTTAB(2,3) " 1. PROGRAM A"
230 PRINTTAB(2,5) " 2. PROGRAM B"
240 PRINTTAB(2,7) " 3. PROGRAM C"
250 PRINTTAB(2,9) " 4. "
260 PRINTTAB(2,11)" 5. "
270 PRINTTAB(2,13)" 6. "
280 PRINTTAB(2,15)" 7. "
290 PRINTTAB(2,17)" 8. "
300 PRINTTAB(2,19)" 9. "
310 PRINTTAB(2,21)"10. "
320 PRINTTAB(2,23)"11. "
330 PRINTTAB(2,25)"12. "
340 PRINTTAB(2,27)"13. "
350 PRINTTAB(2,29)"14. "
360
370 INPUTTAB(2,31)"Which program (1-14)"A
380 IF A=0 THEN 410
390 MODE7:GOTO (480+A*10)
400 MODE7
410 PRINTTAB(4,12)"Goodbye for now"
420 PRINTTAB(4,14)"Have a nice day"
430 END
440
450 REM Add new program titles here.
460 REM Note that *LOAD and *RUN can
470 REM be used as well as CHAIN.
480
490 CHAIN"PROG1"
500 CHAIN"PROG2"
510 CHAIN"PROG3"
```

Listing 1. Simple-to-use disc menu program

Dubious character

G C WRAITH of Kingston-by-Lewes, Essex, has found problems with his Brother CE-60 typewriter, fitted with an interface unit and an ASCII daisywheel. He found that some of the characters on the daisywheel did not have the same ASCII code as the computer. In other words, some of the characters were reversed – for example, the   was printed out as an ~.

Mr Wraith found a solution to his

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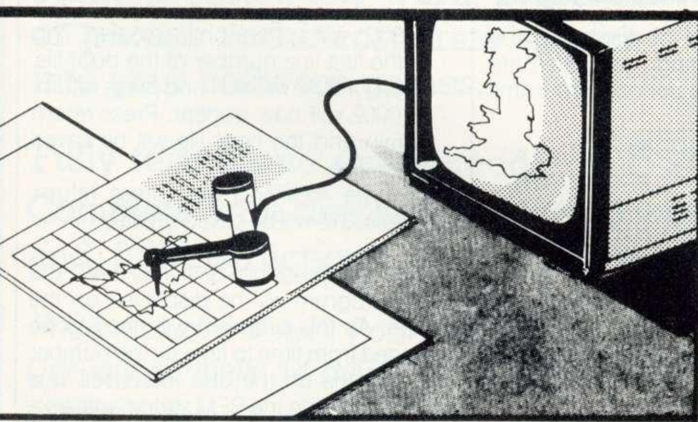
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problem by writing a short program to modify the text. It was only later that he discovered a small green lever beside the keyboard which magically solved the problem without text modification. The source of the problem was really the lack of knowledge of the dealer selling the typewriter, compounded by a printer manual apparently written to confuse.

Sheet cheat

I OFTEN need to put a single sheet of notepaper into my printer (an Epson FX80) to print out a letter. To do this I remove the fanfold paper and put the sheet in its place. The printer issues an out-of-paper message near the end of the page and stops printing. This means that I cannot print down to the bottom of a sheet without altering a dip-switch inside the printer or sending the code to 'ignore end-of-paper message'.

Now I've found a much simpler way. Insert the sheet of paper into the printer with the fanfold paper still in place. The result, printing to the end of the page, and I wind the fanfold paper back – no need to rethread it.

Electron plea

I HAD a complaint about this column recently. Why was there so little about the Electron? The answer is simple. I have had very few queries concerning the Electron, so if your Electron is giving problems, do write in and I'll try to give them an airing. But please don't ask me when or where one can be obtained – I don't know the answer!

Teletext control

THE ITEM on teletext characters in this column of the January issue prompted Jon Warmisham to send a simple but effective program (listing 2) to give the remaining teletext control codes using the user-defined function keys. This now enables the control character as well as the colours to be entered directly from the keyboard using combinations of the function keys and the SHIFT and CTRL keys. The technique used to get the codes into these keys is given on page 142 of the *User Guide*. To get the value 141, the |! enters a value of 128 and the ASC value of |M (CTRL-M) is 13, giving a total of 141.

To complete this short routine a new key strip is included which gives all the codes now possible. Note that the coloured text and graphics options can be obtained only with the 1.2 OS.

Pound note

IF YOU use the £ sign on the computer and then try to print it out, it will appear on most printers as a '. Several readers have asked for ways round this problem. One way on the Epson printers is as follows. Set the character set dip-switch to the English set. If a £ sign is needed, typing a # will give a £ sign. If the # sign is needed for a listing change the character set to the American by typing VDU2,1,27,1,82,1,0 or, in Wordwise, by typing OC27,82,0. Substituting a 3 in place of the 0 will select the English character set again. There are other ways round this in Wordwise, but this method works for program listings too.

Listing 2. Teletext control codes

```
 10 REM Listing 2
 20 REM       EFFECT              CODE
 30 REM double height             141
 40 *KEY0|!|M
 50 REM single height             140
 60 *KEY1|!|L
 70 REM solid graphics            153
 80 *KEY2|!|Y
 90 REM separated graphics        154
100 *KEY3|!|Z
110 REM black background          156
120 *KEY4|!|\
130 REM new background            157
140 *KEY5|!|}
150 REM hold graphics             158
160 *KEY6|!|~
170 REM release graphics          159
180 *KEY7|!|£
190 REM full graphic block        255
200 *KEY8|!|?
```

	CTRL (Graphics)	SHIFT
double height		
single height	red	red
solid graphics	green	green
separated graphics	yellow	yellow
black background	blue	blue
new background	magenta	magenta
hold graphics	cyan	cyan
release graphics	white	white
	conceal	flash
		steady

Key strip incorporating all the teletext control codes now possible with listing 2

NEW DIMENSION IN TIME AND SPACE?

Clive Williamson rides on the high-speed 6502

AT LAST the 6502 second processor is here to relieve us of the major drawback of the BBC micro – its lack of memory space when high-resolution graphics are used (ie, modes 0, 1 and 2). This problem is compounded when a filing system such as disc, Telesoftware or Econet is fitted, because each claims more space from the Beeb's memory map. The addition of a second processor immediately solves the problem because, once connected to the Beeb via the Tube interface, Basic programs are passed over, leaving the main machine to act merely as an input/output processor, handling all the operating system functions, outputs to peripherals and the screen display, and any necessary inputs from the keyboard, joysticks and so on.

Because the workload is shared between two processors, some programs will run nearly twice as fast, particularly those using a lot of graphics. Acorn claims the combination of a BBC B and the 6502 add-on is the second-fastest microcomputer system, beaten only by a 16-bit Sage!

The 6502 second processor has 64k of RAM. Storage space for programs is effectively made independent of screen mode, and there is a minimum of 30k free! This figure can be higher, as will be explained in a moment.

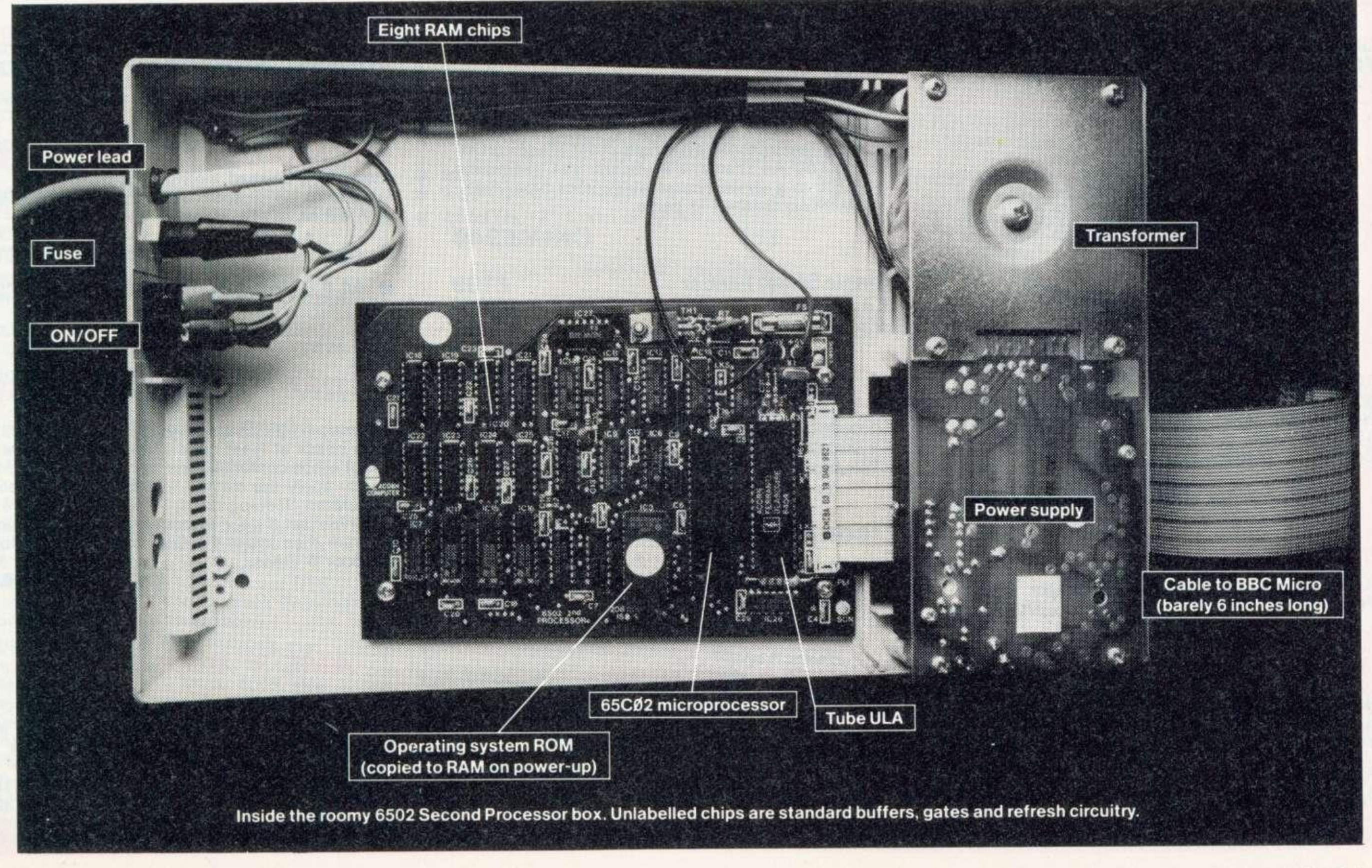
The 6502 comes in a cream plastic case that matches the BBC micro and has its own power supply. Only one processor can be connected to the Tube at a time.

Acorn's patented Tube interface is a high-speed data link that passes information between the second processor and the Beeb's processor at 2MHz. The connection is made through a Tube ULA and 'first in, first out' buffers, which allow instructions from the second processor to be stored until they can be acted on by the main processor. This leaves the second processor free to run software without having to wait until relatively slow functions have been performed, such as drawing graphics on the screen.

The second processor is based on a 6502B chip, running at 3MHz – half as fast again as the 6502A in the BBC model B. Unfortunately, the chip's full 64k of RAM is not available for running programs, and the amount of RAM left free depends on the language in use.

When the second processor is switched on it takes a copy, or 'image', of whatever language is currently on the BBC micro (eg, Basic, View, BCPL). In most circumstances this image is placed in the same position in the add-on processor's memory map – from &8000 to &C000 – that the language would normally occupy in the host machine. This is right in the middle of the 64k RAM, so the space above it (from &C000 to &FFFF) is wasted except for storing machine code routines, leaving about 30k for programs.

page 84 ▶



Inside the roomy 6502 Second Processor box. Unlabelled chips are standard buffers, gates and refresh circuitry.

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IEEE 488	£65	2K Parallel	£58

BROTHER HR-15

DAISY-WHEEL PRINTER

An exceptionally high quality daisy wheel printer at the price of a dot matrix printer. 18CPS; bi-directional, 3K of buffer; has clear buffer facility, carriage skip movement, proportional spacing; underlining; bold print and shadow print. Prints in two colours; super and subscript facility. Impact control facility to vary pressure on paper for making carbon copies. Has Centronics parallel or RS-232 interface. Connects directly to BBC Micro. A ribbon cassette plus a separate red ribbon. Optional extras: single sheet feeder takes up to 150 A4 sheets; a keyboard that transforms HR15 into a sophisticated electronics typewriter. Attractively finished in beige.

ONLY **£349**

Single Sheet Feeder **£199**
Keyboard **£150**
Ribbon **£3**; Daisy Wheel **£18**

LISTING PAPER (Plain)

1,000 Sheets 9½" Fanfold Paper **£7**
1,000 Sheets 15" Fanfold Paper **£9**
Teleprinter Roll (Econo paper) **£4**

(continuous stationery)

1,000 90 x 36mm **£5.50**
1,000 90 x 49mm **£7.75**
1,000 102 x 36mm **£6.25**
Carriage on Printer Paper & Labels £1.50

PRINTER LEAD 36"

Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, etc., Printers.

ONLY £8

Special Extra long 6 foot Cable **£12**

BBC Micro WORD-PROCESSING PACKAGE

A complete word processing package consisting of: BBC Model B, Zenith 12" Green or Amber Monitor, Twin 200K highly reliable (1 year warranty) Teac Disc Drives in matching beige colour, the popular WORDWISE word processor, Watford's own highly sophisticated 62 File DFS interface fitted, the world renowned Brother HR15 Daisy Wheel Printer, Gemini's Beebplot & Beebcalc Spreadsheet Analysis Software discs, 10 blank diskettes, 500 sheets of fan-fold paper. Manuals and all the leads. To enable you to carry your Micro around, we shall pack it in our Antique Brown leatherette Attache carrying case.

ONLY **£1,275** (carr. £15)

(P.S. We will alter the package to suit your requirement. Call in for a demonstration).

5¼" DISKETTES

- 10 Verbatim or 3M Diskettes S/S D/D **£17**
- 10 Verbatim or 3M Diskettes D/S D/D **£27**

DISC ALBUMS

Attractively finished in beige leatherlook vinyl. Stores, protects and displays 20 discs in double-sided clear view pockets. ONLY **£4.95**

PLASTIC LIBRARY CASES

for Disc Storage 5¼" (holds 10) **£2**

LOCKABLE STORAGE UNITS

Attractively finished, strong beige plastic base fitted with dividers. Smoke acrylic top. Supplied with adhesive title strips for ease of filing.

- M-35 Holds upton 35 mini discs **£16**
- M-85 Holds upto 85 mini discs **£20**

FLOPPY HEAD CLEANERS

Unless your office/home is dust free, you should clean heads at least once a week to avoid the risk of cross contamination.
Simply apply the cleaner to one of the specially formulated cleaning discs, insert into the drive and initialise. If your system has no initialisation program then insert the disc and open and close the door 5 times.

£16.00

AMS 3" DISC DRIVES

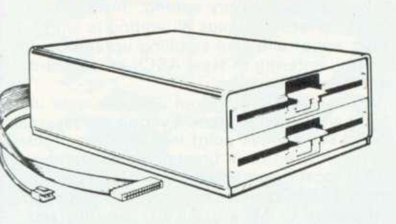
These popular mini disc drives, now available from WATFORD. For details see AMS advert in this magazine. Supplied complete with cables, manual and utilities disc.

Single 100K per side **£163**
Twin 200K per side **£320**

ISC DRIVES CASED WITH CABLES (less PSU)

(All Drives are NEW SLIM-LINE Type)

NEW LOW PRICES



CLS 100 Single, TEC Single sided 40 track 100K, 5¼" Disc Drive **£129**

CLS400 Single, Mitsubishi Double sided 80 track 400K, 5¼" Disc Drive **£188**

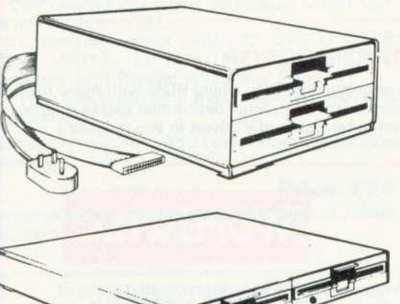
CLS400S Single, Mitsubishi Double sided 40/80 track Switchable, 400K, 5¼" Disc Drive **£215**

CLD200 TEC Single sided 40 track 200K, twin 5¼" Drives **£252**

CLD800 Mitsubishi Double sided 80 track 800K, 5¼" TWIN Drives **£365**

CLD800S Mitsubishi Double sided 40/80 track switchable, 800K, Drives **£399**

CUMANA) DRIVES CASED WITH PSU & CABLES



CS100 TEC Single sided 40 track 100K 5¼" Single Disc Drive **£145**

CS200 TEC Single sided 80 track 200K 5¼" Single Disc Drive **£210**

CS400 Mitsubishi Double sided 80 track 400K 5¼" Single Drive **£259**

CS400S Mitsubishi Double sided 40/80 track 400K 5¼" Single Drive **£340**

CD200 TEC Single sided 40 track 200K 5¼" TWIN Disc Drives **£275**

CD400 TEC Single sided 40 track 200K 5¼" TWIN Disc Drives **£365**

CD800 Mitsubishi Double sided 80 track 800K 5¼" TWIN Drives **£425**

CD800S Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives **£465**

SPARE DRIVE CABLES, SINGLE **£6**; DUAL **£9**

DFS Manual (comprehensive) **£7.50** (No VAT)

You do not require Formatting Discs when ng our DFS as the formatting program is in ROM, nor do you require the expensive 80 track switchable drives as with our DFS, can read and write 40 and 80 track discs on 80 track drive (software switchable).

MITSUBISHI SLIMLINE DISC DRIVES that supply are Double Sided, Double Density , 1 Megabyte. (With BBC Micro 400K after matting.) When used in conjunction with uble Density board one obtains 800K (approx) r formatting. Track density 96 TPI, track to k access time 3mSec. These drives are very , quiet and efficient. We strongly recommend m.

NEW
Mk II 13 ROM SOCKET BOARD

Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. This board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, etc. (At Watford, we think ahead.)

Our 13 ROM SOCKETS BOARD enables the User to increase the Sideways ROM capacity the basic four sockets on the main board upto the full SIXTEEN capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

ONLY £32.50 (carr. £1)

EPROMs & CMOS RAMs for BBC MICRO

2764-250nS (8K ROM)	**£6.95**
27128-250nS (16K ROM)	**£19.00**
6116-150nS (2K RAM)	**£6.00**
6264-150nS (8K RAM)	**£38.00**

MONITORS



MICROVITEC 1431
14" Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **Special Offer £189**

- **MICROVITEC 1451** Hi-res 14" Monitor incl. lead **£319**
- **NEW MICROVITEC 14"** Colour Monitor/Composite Video **£249**
- **KAGA RGB** 12" Medium Resolution Colour **£199**
- **KAGA RGB** 12" High Resolution Colour **£259**
- **KAGA** 12" Standard resolution colour MONITOR/COMPOSITE VIDEO **ONLY £205**
- **BNC** Connecting Lead **£3**
- **RGB** Connecting Lead **£5**
- **ZENITH 12"** Green or Amber Monitor Hi-resolution **£75**

Carriage on Monitors £7 (Securicor)

READY-MADE LEADS

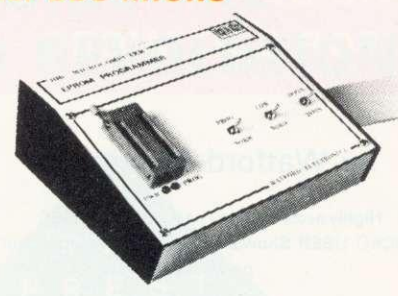
CASSETTE LEADS 7 pin DIN Plug to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**
Monitor Lead, BNC to PHONO	**£3.00**

Disc Drive to BBC Micro Power Lead Single: **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	**30p**	**45p**
RS423 (5 pin Domino)	**40p**	**50p**
Cassette (7 pin DIN)	**25p**	**65p**
ECONET (5 pin DIN)	**20p**	**30p**
Paddles) 15 pin 'D')	**110p**	**215p**
BBC Power Plug 6 way	**75p**	–
Disc Drive Plug 4 way	**70p**	–

EPROM PROGRAMMER for BBC MICRO



At last! – the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMS from 2K bytes up to 16K bytes – **2716 — 2516 — 2532 — 2564 — 2764 — 27128.**

This extremely powerful system is designed for your needs of TODAY & TOMORROW! – BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:

- **COMPLETELY SELF CONTAINED –** Housed in its own sturdy case – Uses its own power supply – connects directly to the 1MHz Bus – Simple and Safe!
- **FULL SOFTWARE SUPPORT** – Comes complete with simple to use fully machine code ROM based software and easy to understand manual. Facilities include Varification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! – This software does not simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.
- **ACORN BUS COMPATIBLE** – Use of the 1MHz connection complies with all Acorn addressing recommendations – That means you can still add-on such things as the TELETEXT, IEEE 488 TUBE and PRESTEL
- Allows more than one program to reside in an EPROM using the ROM Filing System.

ONLY **£89** incl. Manual (£3 carr)

BEEB SPEECH SYNTHESISER

VERSATILE SPEECH SYNTHESISER UNIT FOR THE BBC MICROCOMPUTER

Watford Electronic's very own Speech System. Specially designed so that even a novice can make his BBC talk:-

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxillary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

Only £44

Continued →

THE ULTIMATE DFS FOR BBC MICRO

by Watford Electronics

Highly acclaimed at The ACORN and BBC MICRO USER Shows. What do the independent press say?

Good value for money – *Beebug Aug. '83*
A very worthwhile package – *The Micro User*
You'll be buying a very powerful package – *Personal Computer News*
Superior DFS; Excellent disc sector editor – *Computer Answers*

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

● The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.

● A FORMATTING PROGRAM is built in, permitting formatting to 35,40,80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.

● A DISC VERIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.

● A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidently deleted files and can save weeks of work.

● A double step mode allows the User of 80 TRACK DRIVES TO READ & WRITE BOTH 40 and 80 TRACK DISCS. This mode is software selected for each drive individually, thus enabling a 40 track disc to be copied on to an 80 track very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE 40/80 TRACK SWITCHABLE DRIVES.

● A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.

● When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.

● Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1100, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K75 long.

● An advanced COPY command is included which will prompt the user, requesting whether to copy each file.

● RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.

● OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.

Continued:

BEEBFONT ROM

BEEBFONT is a remarkable new concept in BBC software, exclusively available from Watford. Once fitted, the 16K ROM will enable you to produce attractive text displays in following different styles:

ABCDEFGHIJKLMNOP
abcdefghijklmnop
ABCDEFGHIJKLMNOP
ABCDEFGHIJKLMNOP
abcdefghijklmnop
ABCDEFGHIJKLMNOP
ABCDEFGHIJKLMNOP
abcdefghijklmnop
ABCDEFGHIJKLMNOP
ABCDEFGHIJKLMNOP
abcdefghijklmnop
ABCDEFGHIJKLMNOP
ABCDEFGHIJKLMNOP

★ **It works in modes 0, 1, 2, 4, using full colour.**
★ Simply use Ctrl–V to select the font and all further screen output will be in a new style.
★ Even the ordinary Beeb character set can be enhanced by doubling height or width and emphasising to give bold print.
★ A comprehensive editor is included which enables the user to design his own characters.
★ A spooling program is provided, which enables pre-formatted text files to be displayed on an EPSON FX, RX, and NEC Printers, using the full range of character styles. (Please specify printer type when ordering.)
★ This really must be one of the most original and exciting products of the year.
★ A twenty page manual is provided and the demo/editor software comes on disc or cassette (please specify when ordering). **ONLY £39**

DFS continued:

● 2K of RAM can be reclaimed from the DFS by setting "PAGE" to & 1100.

Now with extra features:

● The powerful library system has been extended so that libraries now work on all accesses not only *RUN. This allows you to have a utility directory with all your commonly used programs without muddling in your current workfiles. Very useful for BCPL User.

● Programs can now reside lower in memory by reclaiming some of the DFS' workspaces, indeed PAGE can be taken as low as £1100 under most circumstances.

● To make DFS easy to use, wild cards ("*") have been made vastly powerful, e.g. *INFO

A gives information on all files in the current directory which have an "A" anywhere at all in their filename.

● Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

● Fully compatible with BBC TELETEX and TORCH Systems

DFS ROM **ONLY £29**
Complete Disc Interface Kit including DFS ROM and fitting instructions ONLY £95
Comprehensive and clearly written DFS Manual. **£7.50 (No VAT)**
P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for the highly sophisticated Watford's DFS ROM for **ONLY £25**

Watford's DFS is exclusively available from Watford Electronics. We DO NOT retail through any Dealers.

BEEBMON

Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.
In use as a debugging tool, you run code under a total emulation system. Everfelt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.
Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page.
How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a vertual BBC, so special memory locations like the ROM latch are not actually accessed by your programs; instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being excuted at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

SPECIAL OFFER THIS MONTH
£19

DISC DOCTOR

A sophisticated Disc Utility ROM with many useful commands. (For detail description please refer to Computer Concept's advert in this magazine.)

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: £

Computer Concept's

Graphics ROM £2

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool.
A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL, ASCI and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.
Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.
All these and other facilities for ONLY **£16**
(Price includes a comprehensive manual and fitting instructions.)



ACCESS ORDERS BY TELEPHON
Simply phone your ord
through. We do the re
(0923) 50234/4058

WATFORD'S BEEB PRINTER ROM



"Makes Printing Childs Play"

e you fed up with not being able to unravel your inter manual and use all those features you paid r? Need sensible paging for use in the creation of ooklets? Then you certainly need our Beeb Printer OM.

machine code printer utility in ROM.

'Single' key operations replace control code quences for underline, font and size selection, per movement, etc. Up to 30 come pre-defined, thout effecting normal fn key usage.

This rom allows easy control of your rinter from 'Within' WORDWISE text. stead of long escape sequences, you just C' a single number to Select, Underline, int Styles, etc.

Automatic fanfold page margins. Puts gaps in stings. PRINTed text etc to skip the folds. The gap ze alternates to minimise paper wastage when sing binders.

Form feed and related commands, made vailable on ALL printers. Can also provide a left argin.

User defined characters embedded within text e printed as on VDU.

★Commands select option for GP100, STAR, NEC, MX/FX, LP VII/DMP100, DMP200. Operates with Parallel and Serial Printers.

Fully functional with the popular WORDWISE wordprocessor.

Supplied complete with a comprehensive 50 page manual.

Price: £24

When ordering, please specify the make of printer ou have.)

SPECIAL OFFER

uy BEEB PRINTER ROM and any one of the two CREEN DUMP ROMS for

ONLY: £33 (A saving of £7+)

TWO NEW GRAPHICS SCREEN DUMP ROMS

DUMP OUT 2

A versatile machine code hi-res Screen Dump ROM.

- You can now have small or large 2 tone umps and multi-tone 'colour' pattern dumps 8 distinct mode 2 shades) on every printer.
- *Commands initiate the required dump ptional parameters may be included for colour masking and selecting the part of the screen to e dumped.
- Clever use of the processor stack means hat no workspace is required! (Multitone umps also use 2 zero page locations.)
- For GP80/100/250, STAR, NEC, EPSON MX/RX/FX, LPVII, DMP100/120/200/400.
- Screen modes 0, 1, 2, 4, & 5.
- Instruction Manual

All this for ONLY **£15**

EPSON DUMP ROM

specially designed Dump ROM for EPSON RX nd FX Printers. Vill accurately DUMP all Screen modes ncluding TELETEXT, GRAPHICS and DOUBLE EIGHT. MULTITONE DUMPS are also upported. Simple single command (*SCDUMP) peration. **Only: £16**

WATFORD JOINS THE COMMUNICATION REVOLUTION

MODEM 84

P
P R E
P R E S T
P R E S T E L
E S T E L
T E L
L

Prestel®

A British Telecom Service.

With the launch of Watford's MODEM 84 you can now hook into PRESTEL, MICRONET, HOMELINK, TELECOM GOLD, etc., for about the cost of a good tape recorder. Prestel gives you access to an incomparable database covering almost every subject under the Sun. There is Micronet with lots of free programs that you can download and run. Details of Clubs and User groups, a diary of meetings and exhibitions, news and reviews, technical information, etc. There is Homelink with On-line banking. And there is armchair shopping, travel information, Entertainment, World News, Sports News, Business News, Weather information, Electronic mail and lots more. The basic Prestel subscription is only £5 per quarter for domestic user and at off-peak times there is no charge for access time. Can you afford not to be part of this revolution?

Now using the latest techniques and the new generation of Modem chips, Watford have developed a Modem that is newer, better and yet cheaper than any on the market.

Compare the Specifications:

MODEM

- Direct-connect Modem using BT approved isolation components.
- Full Duplex V23 operation for Prestel and TELECOM GOLD operation (1200/75 Baud).
- User-to-User half duplex 1200/1200 Baud operation with AUTOMATIC SEND/RECEIVE switch (BEWARE – most MODEMS switch manually between send and receive, which precludes the use of intelligent user-to-user software).
- Simple single button operation and comprehensive LED status display.
- Attractive Beige case to match your Micro. Sized to sit on the disc drive.

(P.S. BT approval applied for).

NEW SUPER PRESTEL INTERFACE ROM

Fully compatible with Watford's MODEM 84 as well as with PRISM and most other Modems.

- Supports full Prestel Colour Alpha and Graphic Characters including Double Height, Flashing, Conceal/Reveal.
- Called by simple *PRESTEL command. Disc and Tape configurations fully supported.
- Telesoftware downloader included.
- Comprehensive MAILBOX facilities including offline editor.
- Auto Logon sequence, can be burnt into ROM if desired.
- Unique "TAG" facility allows tagging and recall of interesting pages – avoids the common and annoying 'NOW WHERE WAS THAT PAGE' problem.
- Page load and save to tape or disc. Pages are automatically saved under Page Number reference in a 'FRAME' directory.
- Print page options are ASCII only (i.e. with supression of Graphics) – fast and works with any printer – as well as a full graphics dump for the popular Epson printer.
- 'USER' function call built into interface with specialist add-on routines (your own as well as ours).
- All the above facilities available from Function Keys. An overlay is provided giving simple yet comprehensive guidance to the key functions.
- Comprehensive instruction manual supplied.

PRICES:

SOFTWARE in ROM incl. Comprehensive MANUAL **ONLY: £25**

MODEM 84, SOFTWARE in ROM & Operating MANUAL **Only: £75** (Carr. £1.50)

(Please allow upto 28 days for delivery)

Coming soon:

BEEB User-to-User ROM. For automatic user-to-user communication including file/program transfer. (Requires Watford's MODEM 84 or PRISM 2000).

Please write to Watford Electronics for full details, Order and Application Forms.

NEW FX80 PRINTER DRIVER for VIEW

Do you want to use Italics or Enlarged Characters with View? French or German Characters? These and other FONTS from FX80 character sets can be accessed using our Printer Driver with VIEW. The disc contains an example as well shows how to use. Available on 40 or 80 track Disc. **ONLY: £7.50**

VIEW

Acorn soft's Wordprocessor ROM. **£52**

FORTH ROM for BBC

This superb (FIG FORTH) compiling language now available in ROM. Simply plugs into one of the ROM Sockets. Manual included. **£33**

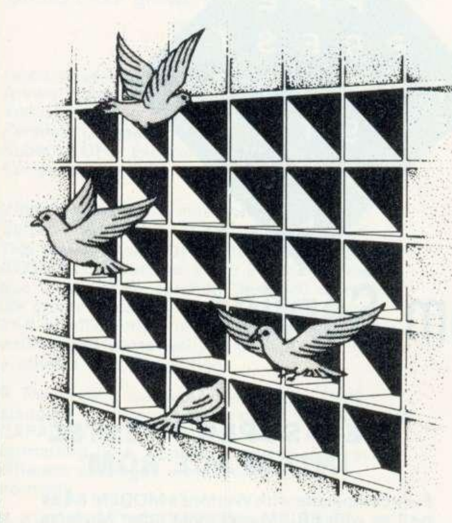
ONE STOP SHOP

WATFORD ELECTRONICS

Continued →

WONDERFUL WATFORD

TWO NEW DATABASE SOFTWARE for BBC Micro



★ ★ NEW LAUNCH ★ ★

DISCDATA

At last for BBC Micro Disc users, Watford Electronics have produced 'DISCDATA' which must be the most versatile general database at the price on the market. The length of your files is restricted only by the space on your disc. You can have upto 20 fields with 'page' length records of upto 254.
Characters. The program is completely menu driven obviating reference to a manual although written guidance is given with the program. Add and delete records, amend title, field names and records, sort on any field and search for any record or group of records in any field. You do not need to abandon or rewrite your files if you wish to add additional fields or extend the length of any field, the program will rewrite the files for you. Your files can be in any drive. Output can be in 40, 80 or 132 character width with Printer routines. Two forms of output are provided for, horizontal for label type output and a tabulated output with title and headings. What is more, the selected fields can be placed in any order on the screen. In the horizontal mode you can scan backwards or forwards with wrap around effect. Output can be started or stopped anywhere in the file. There is automatic totalling on decimal fields and an automatic count of the number of records output.

On disc at **Only £15**

It has to be the best value.

★ ★ NEW ★ ★

FILE-PLUS

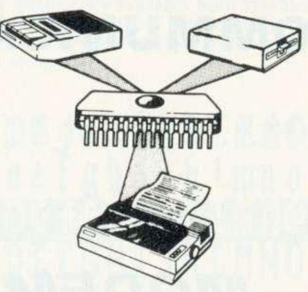
A 16K ROM containing the most flexible and easy to use disk based Database system on the market. A database may occupy your total on-line storage capacity. You may design any number of data entry forms using a "paint" on screen technique. Forms may be upto 3 screens in size. Any of these forms may be used to Add, Delete, Update, Print and Spool records from your Database. Quick search facility on any text field. A query language provides full maths support (–, +, /, *, +–9999999999.9999) and compare facilities (=, ▷, ◁▷, ◁=, ▷=, &, I) when used with the keywords – Assign, Compare, Display, End, Goto, Iff, Ift, Print, Read, Search, Spool and Update. Full printed output control via embeded commands. Supplied with 70 page manual and fitting instructions.

DISC DATA	**Only £15**
FILE-PLUS	**Only £43**

Send SAE for Fact Sheet

★ ★ STAR LAUNCH ★ ★

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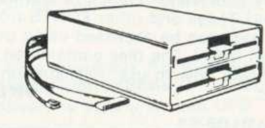
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MATHEMATICAL ROOTS

In this concluding article of his series Stan Froco introduces the mathematical model of computation on which Lisp is based

I HAVE already described how Lisp variables have values, which can be set by use of the SET and SETQ functions, for example:

```
(SETQ A 42)
```

to give A the value 42. Very often we wish to associate a number of different values with a variable. For example, as an oarsman I may wish to keep details of the crew I row with, such as their height and weight and position in the crew. We could use the name of the person as a variable and give a list of the relevant values, for example:

```
(SETQ Roger '(185 85 3))
(SETQ Jackie '(162 52 cox))
```

However, this is far from clear, not least because it is not immediately obvious that the values represent height, weight and position, in that order. A list of dotted pairs would be far more helpful.

```
(SETQ Roger
  '((height . 185) (weight . 85) (position .
  3)))
SETQ Jackie
  '((height . 162) (weight . 50) (position .
  cox)))
```

Such lists of name-value pairs, describing properties, are so useful that they are built into Lisp. As well as having a value, any variable may also have a property list. This has exactly the form of the lists shown above. Lisp provides some functions for handling the information contained in these lists.

```
(PUT 'Roger 'height 185)
(PUT 'Roger 'weight 85)
(PUT 'Roger 'position 3)
(PUT 'Jackie 'height 162)
(PUT 'Jackie 'weight 52)
(PUT 'Jackie 'position 'cox)
```

give Roger and Jackie values for the properties 'height', 'weight' and 'position'. We can find out the value of any property by using, for example,

```
(GET 'Jackie 'position)
```

which in this case would return the character atom 'cox'. Should we ask for a property that doesn't exist GET will return NIL, ie, a NIL property list is the same as a non-existent one. Once we have finished with a property we can remove it with:

```
(REMPROP 'Roger 'weight)
```

'Several types of function may be defined'

which would remove the 'weight' property from Roger's property list. The whole property list can be obtained by using

```
(PLIST 'Roger)
```

Using these functions, we can build useful databases, or associate additional information with variables (as in the example below). Note that PUT and GET are like SET, not SETQ. You need to put a quote in front of the variable, since it will be evaluated.

The object list (see last month's article) doesn't just keep a list of variables whose value is defined, it also holds those variables that have a non-NIL property list. Thus to remove an object from the object list you not only have to give it the value UNDEFINED, but remove its property list using REMPROP. It is perfectly in order for a variable to have a property list, but an UNDEFINED value.

I introduced DEFUN and user-defined functions in the first article. I also showed how a function defined in Lisp has as value a list of the form:

```
(LAMBDA (arguments) (body of
function))
```

In fact, Lisp gives a fair range for defining several different types of function. It is often useful to have optional arguments for a function. We do this in Acornsoft Lisp by enclosing optional arguments in brackets. If the function is called without the optional argument being specified it takes the value NIL. As an example we could combine the functions MINUS (which negates a number) and DIFFERENCE (which subtracts two numbers) as follows

```
(DEFUN myminus (a (b))
  (COND
    ((NUMBERP b) (DIFFERENCE a
    b))
    (T (MINUS a))))
```

The optional argument in this case is b. It should be fairly obvious that any optional argument must come at the end of the argument list (and in its own brackets).

It may be convenient to let an optional argument take a default value other than NIL. In this case the optional argument and its default value are specified as a dotted pair. The following function prints its first argument indented by a number of spaces given by its second argument. If the second argument is missing then no indentation is done.

```
(DEFUN indent (item (spaces . 0))
  (LOOP
    (UNTIL (ZEROP spaces))
    (SETQ spaces (SUB1 spaces))
    (PRINC BLANK))
  (PRINTC item))
```

By far the commonest way of using optional arguments is as local variables, like the LOCAL command in Basic. The

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Listing 1: The Lisp picture drawing system

```
(DEFUN do-circle (x (w) (z))
  (SETQ w (QUOTIENT (TIMES x 7) 10))
  (SETQ z (DIFFERENCE x w))
  (plot 0 x 0)
  (plot 1 (MINUS z) w)
  (plot 1 (MINUS w) z)
  (plot 1 (MINUS w) (MINUS z))
  (plot 1 (MINUS z) (MINUS w))
  (plot 1 z (MINUS w))
  (plot 1 w (MINUS z))
  (plot 1 w z)
  (plot 1 z w)
  (plot 0 (MINUS x) 0)))

(DEFUN do-box (x y)
  (plot 0 (MINUS (QUOTIENT x 2)) (MINUS (QUOTIENT y 2)))
  (plot 1 x 0)
  (plot 1 0 y)
  (plot 1 (MINUS x) 0)
  (plot 1 0 (MINUS y))
  (plot 0 (QUOTIENT x 2) (QUOTIENT y 2)))

(DEFUN do-shift pl
  (plot 0 (CADR pl) (CADDR pl))
  (draw (CAR pl))
  (plot 0 (MINUS (CADR pl)) (MINUS (CADDR pl))))

(DEFUN do-add pl
  (draw (CAR pl))
  (draw (CADR pl)))

(DEFUN do-colour pl
  (VDU 18 0 (CADR pl))
  (draw (CAR pl)))

(DEFUN add (p1 p2)
  (LIST 'pic 'do-add p1 p2))

(DEFUN shift (p x y)
  (LIST 'pic 'do-shift p x y))

(DEFUN circle (r)
  (LIST 'pic 'do-circle r))

(DEFUN box (x y)
  (LIST 'pic 'do-box x y))

(DEFUN white (p)
  (LIST 'pic 'do-colour p 3))

(DEFUN yellow (p)
  (LIST 'pic 'do-colour p 2))

(DEFUN red (p)
  (LIST 'pic 'do-colour p 1))

(DEFUN black (p)
  (LIST 'pic 'do-colour p 0))

(DEFUN draw (p)
  (EVAL (CDR p)))

(DEFUN gprint (x)
  (COND
    ((ATOM x) (PRINT x))
    ((EQ (CAR x) 'pic) (clear-screen) (draw x))
    (T (PRINT x))))

(DEFUN plot (n x y)
  (VDU 25 n
    (REMAINDER (SETQ x (PLUS x 16384)) 256)
    (DIFFERENCE (QUOTIENT x 256) 64)
    (REMAINDER (SETQ y (PLUS y 16384)) 256)
    (DIFFERENCE (QUOTIENT y 256) 64)))

(DEFUN clear-screen ()
  (VDU 16))

(DEFUN set-graphics ()
  (VDU 22 5 28 0 5 19 0))

(DEFUN end-graphics ()
  (VDU 22 4))

(DEFUN gsuper ((u))
  (set-graphics)
  (LOOP
    (PRINC CR 'Eval:! )
    (SETQ u (EVAL (READ)))
    (UNTIL (EQ u 'end) (end-graphics))
    (gprint u)))
```

local variables are just declared as optional arguments that never get used when calling the function.

The other important type of function that it is useful to define is one whose arguments are not evaluated before it is called. Normally arguments are given in list form:

```
(DEFUN FRED (A B C)...
```

If instead we just give a single argument not in brackets, then on calling that function the arguments are not evaluated but passed to the argument as a list. For example, we can define SETQ in terms of SET:

'A Lisp programmer avoids the use of variables by breaking programs down into functions'

```
(DEFUN SETQ arglist
  (SET (CAR arglist) (EVAL (CADR
  arglist))))
```

On giving, for example

```
(SETQ a (PLUS 2 2))
```

arglist ends up with the value:

```
(a (PLUS 2 2))
```

CAR of arglist is the character atom a, which we give as the first argument to SET. CADR of arglist has the value:

```
(PLUS 2 2)
```

We then use EVAL to evaluate this, since SETQ evaluates its second argument. EVAL takes a list and evaluates it as though it were a function typed in for evaluation. It is thus the inverse function to QUOTE, cancelling its action.

The names for the different types of function available in Lisp are:

Expr – A function defined in Lisp whose arguments are evaluated before it is called.
FExpr – A function defined in Lisp whose arguments are not evaluated before it is called.
Subr – A function defined in machine code whose arguments are evaluated before it is called (eg, DIFFERENCE).
FSubr – A function defined in machine code whose arguments are not evaluated before it is called (eg, SETQ).

Lisp has its roots in a mathematical theory called λ-calculus. λ is the Greek letter lambda (hence the LAMBDA in Lisp function definitions).

At school you may often have written down functions in mathematics in much the same way as you define them in Basic. For instance, the function f, which squares a number, might be defined as:

$f(x) = x * x$

Compare the Basic:

```
DEF FNf(x) = x * x
```

and so on.

We have defined a function whose name is f, and whose effect is to square its argument. The name of the variable we have used as argument (x here) is, in fact, not relevant to the behaviour of the function. We could equally well have defined f as:

$f(y) = y * y$

When we use the function to work out a square we needn't know what the argument is called.

It would be nice to use function names as variables having values, as in algebra. We could then deduce rules for manipulating functions and evaluating them. In algebra we may associate a variable with a value

$a = 3$

If we then used the variable a elsewhere we could substitute the value 3 instead. For functions λ-notation gives a way of representing the value of a function. This is how the function f is represented.:

$f = \lambda\ (x)(x * x)$

This is called a λ-expression. The λ is followed by a list of arguments in brackets and then the definition or 'body' of the function in brackets. Note the similarity to a Lisp function definition.

Now we can use f rather like a variable in algebra and build up a set of rules for manipulating and simplifying expressions made up from such variables and for applying the functions they represent to arguments, so that things like:

$f(3)$

are simplified to

9

Essentially a Lisp system consists of a program to apply these rules and evaluate λ-expressions. The list notation happens to be a convenient way to represent these expressions.

The trouble with most Lisp implementations is that they don't quite go the whole way in implementing λ-calculus (the system of rules for handling λ-expressions). Not only can λ-expressions return numbers – they can also return λ-expressions as results. It is possible in Lisp to do this (by building up lists with LAMBDA in). For example, the following function takes a number as argument and returns as result a function to add that number to any other number.

```
(DEFUN makeadd (n)
  (LIST 'LAMBDA '(x) (LIST 'PLUS 'x
                                  n)))
```

Thus when given:

```
(SETQ add5 (makeadd 5))
```

we get a function to add 5 to its argument so we can do:

```
(add5 42)
```

and get:

```
47
```

as value back. If we look at add5 we find it has the value:

```
(LAMBDA (x) (PLUS x 5))
```

Returning λ-expressions as values is not particularly convenient in Lisp, and doesn't usually work properly (for reasons beyond the scope of this article). The only built-in function that does is DEFUN. A function which returns a value as result is called a 'first order' function, one that returns a λ-expression is a 'higher order' function. This often helps in making more natural use of Lisp's facilities.

In pure λ-calculus there are only λ-expressions, no variables or numbers (these can both be replaced by λ-expressions). The only thing that λ-expressions return as results are other λ-expressions. Lisp is rather a poor model of λ-calculus at this level; it has to bend the rules, which leads to anomalies. These anomalies show up as the existence of variables and the functions to handle them. A natural Lisp programmer will tend to avoid the use of variables by breaking programs down into lots of functions.

One of the reasons for Lisp's conflicts with λ-calculus is the need to implement the language efficiently. I'll cover one or two of the practical points involved, so that you can build your own Lisp interpreter in, say, Basic. I'll demonstrate only the simplest solutions to the problems, since the ones used in commercial systems (such as Acornsoft Lisp) are rather complex.

I described last month how each object in Lisp can be represented in four bytes. In practice this isn't quite enough; you need something to tell you whether the item is a dotted pair (so it should be treated as two halves containing pointers) or an atom of some kind (and if so which kind). This could be done by use of a fifth byte saying what the other four bytes are. This is the 'flag' byte. For example, we have seen:

- dotted pairs
- character atoms
- number atoms
- Subr atoms
- FSubr atoms

Remember of course that Expr's, FExpr's

and other lists are just a special case of dotted pairs. Typically, we would use one bit in the flag byte for each type of object. This leaves a few bits over, which we use in the garbage collector (see below).

Every time we call CONS, either explicitly or implicitly, we use some more memory and eventually we run out. Particularly on small systems like the BBC micro this happens fairly quickly. However, although we have given out a lot of memory we may well have a lot lying around unused. For example if we do:

```
(SETQ A '(B C D))
(SETQ A '(X Y Z))
```

the memory used to hold the list (B C D) is no longer in use and could be reclaimed.

The strategy used in a simple interpreter might be as follows. When the system starts up it builds up a list of five-byte cells, called the 'free-list'. Every time memory is needed it is taken from this free-list. When the free-list runs out we have to go round collecting up unused cells and building up a new free-list. This is called 'garbage collection'. One very popular way of collecting up unused store is the 'mark-and-sweep' method.

'Just as the GOTO disappeared from languages designed in the '70s, so perhaps variables will disappear from the languages of the '80s'

One bit of each flag byte is reserved for the garbage collector (the GC bit). First we step through memory five bytes at a time, clearing the GC bit to zero. We then take the object list, the list of items Lisp knows about (and hence which cannot be reclaimed). Taking each item on the object list in turn, we set the GC bit to 1. If it is a dotted pair we follow down the pointers, setting the GC bits in all the things pointed to, until there are no pointers to follow. Now all things that can be collected up and re-used are left with 0 in their GC bit. This is the end of the mark phase. We now step through memory once more, chaining all these cells together (the sweep phase). This can then be used as the new free-chain. By the time it runs out more store will have become free and we can just call the garbage collector again to get another free-chain.

The final implementation problem concerns variables. Any character atom can be used as a variable name. We can have a list of variable name-value pairs, rather like the property lists described before. This associates the name of a variable with its value. For example, here is an association list for three variables, x, y and z:

```
((x . 42) (y . (a list)) (z . text))
```

This is sometimes called an association list (Acornsoft Lisp provides a function, ASSOC, to manipulate them). Every time we use a variable we can look up its value on the association list. When we evaluate a function we put new pairs on the head of the list, associating arguments with their values. On return these associations are no longer of use so we remove them. This technique is called 'deep binding'. Unfortunately it becomes very slow as the association list gets longer, and these days it has been superseded by faster methods.

With this information you could in theory construct your own Lisp system. In practice it is not so simple and further reading is necessary – see bibliographical panel.

The Acornsoft system is an interpreter, ie, it directly runs the program you enter rather than translating it into machine code (which would run faster). Lisp compilers are common on mainframes and usually generate a good standard of code. This is not surprising, since Lisp was first implemented as a set of useful machine code subroutines in the days when high-level languages did not exist. Lisp compilers are of course written in Lisp.

A number of people have tried to improve on Lisp by designing pure functional languages based on λ-calculus. The problem with most such languages is that on conventional machines they run horrendously slowly (perhaps ten or a hundred times slower than languages such as Fortran or Pascal). By not being a pure functional language Lisp manages to compete effectively with conventional languages. A number of attempts are also being made to provide efficient functional languages (eg. SASL, KRC and Ponder).

You may wonder why so much effort goes into languages based on a very abstract model of computers. There is a belief that a properly designed functional language makes programming easier. In the 1970s we saw the emergence of structured programming as a methodology for improving programming speed and standards. By replacing the unstructured GOTOs of Fortran and Cobol with the structured FOR and WHILE loops of Algol and Pascal it was found programmers could produce reliable code more easily. It has been suggested that the next stage after structured programming is functional programming. Just as the GOTO disappeared from languages designed in the '70s so perhaps variables will disappear from the languages of the '80s.

Of course, there are models of computation other than λ-calculus on which computer languages have been based. Snobol, for example, is a language based on the Markov algorithm. It performs all operations by manipulating strings of characters. Prolog, the programming language behind the Japanese fifth generation project, is based on predicate calculus. Programs are represented as a series of facts and a set of rules relating those facts. To run a program you ask the system to deduce new facts by applying these rules to the facts it already knows. This language is well suited to running on multiprocessor computers, and will probably become prominent when such machines become widely available.

Artificial intelligence is the field with which Lisp is most widely associated, and we'll look at two examples in the area of natural language processing.

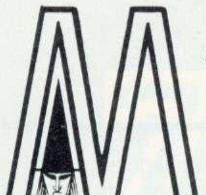
One of the earliest and best-known attempts at natural language processing was Joseph Weizenbaum's program Eliza. This was meant to mimic a psychiatrist interviewing the user. It used pattern-matching to pick out key words in the text you input and turn it round as a reply. Here is part of a sample conversation (the computer output is in italics).

MEN ARE ALL ALIKE
IN WHAT WAY
THEY'RE ALWAYS BUGGING US ABOUT SOMETHING OR OTHER
CAN YOU THINK OF A SPECIFIC EXAMPLE
WELL MY BOYFRIEND MADE ME COME HERE
YOUR BOYFRIEND MADE YOU COME HERE
HE SAYS I'M DEPRESSED MUCH OF THE TIME
I'M SORRY TO HEAR YOU ARE DEPRESSED
and so on

When it can't work out how to turn a sentence round (if it cannot find one of its keywords, for example) Eliza trots out one of a stock of general comments. Having found a keyword, Eliza uses various rules to see how to respond. For example if *you* is followed by *are* then the input text is probably an assertion. Keywords are given priorities, so if more than one occurs the most important is used.

The program was sufficiently powerful to cause some controversy in its time. One of the most interesting findings was that it could have the calming influence of a real psychiatrist on upset people. It is a fairly small program, and David Johnson-Davies of Acornsoft and myself have run it on the BBC micro.

Eliza made no proper attempt to store information about the input text. More



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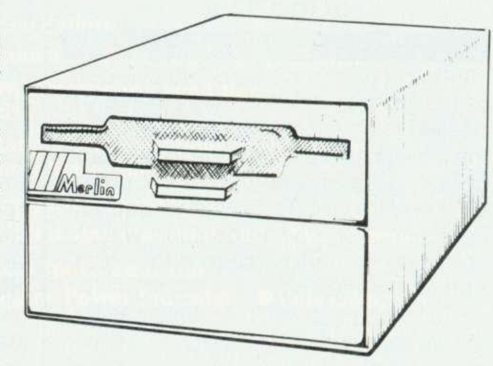
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recent approaches build up data structures representing the syntax and semantics (ie, meaning) of the input text. Words are ascribed meanings from a built-in dictionary, and by looking at the context in which words occur. An impressive recent example is a program to summarise English text, Scrabble, written by John Tait at Cambridge. As an example, given the input text:

> JOHN WENT TO THE ZOO. HE SAW THE LIONS AND TIGERS. HE WANTED TO GIVE MARIEL A PRESENT AND HE THOUGHT SHE WOULD LIKE A TIGER. HE WENT TO A SHOP WHICH SOLD THEM AND GOT ONE. SHE LOVED IT UNTIL IT ATE HER.

Scrabble summarises this as:

> JOHN WENT TO A ZOO. HE BOUGHT A TIGER FOR MARIEL BUT SHE LIKED IT UNTIL IT ATE HER.

This program analyses text a paragraph at a time and attempts to pick out the most relevant clause(s). Notice how the computer understands the concept of commercial transactions. The input text contains information about selling and getting a tiger. The summary replaces this by the single word BOUGHT (which occurs nowhere in the input text). In case you are worried about the power such programs demonstrate be reassured. It can't understand everything; in particular the concept of making things causes problems. Given:

> JOHN WAS HUNGRY SO HE SENT MARY TO THE KITCHEN. SHE GOT SOME STEAK FROM THE FRIDGE AND MADE A PIE. JOHN LOVED IT.

The summary is:

> MARY, WHO WAS DOING SOMETHING CAUSING A PIE TO EXIST, WAS IN A KITCHEN BUT JOHN WAS HUNGRY AND HE LIKED IT.

Natural language processing still has some way to go!

My example program is based on one in *Lisp on the BBC Microcomputer*. It implements a simple picture drawing system using the graphics facilities of the BBC micro. The program is given in listing 1.

The way we will represent pictures is as lists of the form:

(pic function arg_1 arg_2…)

The character atom, pic, starts the list to say 'this is a picture'. Then there is a function that will draw the picture, followed by its arguments. The possible functions are

- do-circle — Draws a circle of a given radius (I actually cheat by just drawing an octagon).
- do-box — Draws a box, the sides of which are given by its two arguments.
- do-shift — The first argument is a picture represented as above, the second and third are shifts in the x and y directions. We do not wish the list to be evaluated as a function so this function does not evaluate its arguments.
- do-add — The two arguments are pictures. It draws the first one, then the second. Again it must not evaluate its arguments.
- do-colour — The first argument is a picture, the second a colour to draw the picture in. Again, the arguments are not evaluated.

We then have a number of functions to generate picture representations which use these functions. For example:

(box 100 200)

returns the list:

(pic do-box 100 200)

That is, the representation of a box 100 pixels by 200 pixels. We then have a number of supplementary functions to make the system usable. The function draw takes a picture and draws the thing it represents on the screen. The function gprint draws its argument if it is a picture representation, otherwise it just prints it out. The function plot is exactly the same as the PLOT statement in BBC Basic. The adding of 16384 is to get the sign of the numbers used correct.

We have two functions for changing mode, using the VDU function. Lisp has no proper equivalent of the Basic MODE statement. Changing mode will usually work only if the new mode uses the same amount of memory or less for its screen. For this reason it is important to use this graphics system having started Lisp up in mode 4 or 5. Set-graphics and end-graphics switch between modes 4 and 5 (both of which have the same size screen memory) and set up a text window for plotting. Clear-screen is used to clear the graphics area.

Finally, gsuper starts up the graphics supervisor. This sits in the usual READ-EVAL-PRINT loop, but uses gprint, so if a picture is generated it is plotted, rather than its value printed out. As a demonstration, try:

```
(gsuper)
(DEFUN spider (n)
   (COND
      ((MINUSP n) (circle 0))
      (T (add (circle n) (spider
                  (DIFFERENCE n 20)))) ))
(SETQ web (spider 300))
(SETQ wheel
   (shift
      (add (yellow web) (red (shift web
                                    100 100)))
      500
      300))
wheel
'end
```

There is potential with this system for some improvement (catching errors, for example). Given a rather larger machine it could grow into quite a reasonable computer-aided design language.

I would like to thank Arthur Norman and James Davenport who (along with numerous others) gave me considerable help in preparing these articles.

Further reading

My recommendations for further reading include articles in scientific journals and may prove difficult to obtain except through university or national libraries. The books should be more widely available.

The best books on Lisp are probably *Lisp on the BBC Microcomputer* by Arthur Norman and Gillian Cattell (Acornsoft, 1983); *Artificial Intelligence Programming* by Charniak, Riesbeck and McDermott (Lawrence Erlbaum Associates, 1980), which also gives a broad introduction to artificial intelligence; and *A Programmer's Introduction to Lisp* by W D Maurer (MacDonald/American Elsevier Computer Monographs, 1972) – nothing like as good, being somewhat dated, but relatively cheap. The latter two books describe a slightly different Lisp system, but most of the ideas are relevant, and they cover λ-calculus in more detail. Finally there is *The Anatomy of Lisp* by Allen (McGraw-Hill, 1978), which describes the problems involved in building a Lisp system.

Snobol is described in *The Snobol4 Programming Language* by Griswold, Poage and Polansky (Prentice-Hall, 1976). Prolog is described well in *Programming in Prolog* by Clocksin and Mellish (Springer-Verlag, 1981). Eliza was described in the Journal of the Association for Computing Machinery, Vol 9, No 1 (January, 1966) and reprinted in Vol 26, No 1 (January, 1983). An account of Scrabble appears in *Topics in Artificial Intelligence*, edited by Campbell and Steels, to be published by Ellis-Horwood later this year.

Guest editor this month is Robin Newman, who brings insights into the Beeb's OS calls, plus hints on printer management

Useful OS calls

OVER recent months there have been discussions in *Acorn User* about methods of accessing the operating system. In several cases authors have resorted to 'dirty but quick' methods of extracting information, and I would be the first to condone such methods in appropriate circumstances. For instance, if I wanted to know the station number of an Econet machine without doing a control break, I would type P.?&FE18 rather than go to the trouble of using the legal approach, X% = &70: Y% = 0: ?X% = 8: A% = &13: CALL &FFF1: P.X%?1, which is a bit more complicated.

Having said that, it's worth delving into the many OS calls that Acorn provides, because there's a wealth of information available. It can be a bit daunting, but once you have got the hang of the 'call plus parameter block' approach that Acorn uses it's not really that bad.

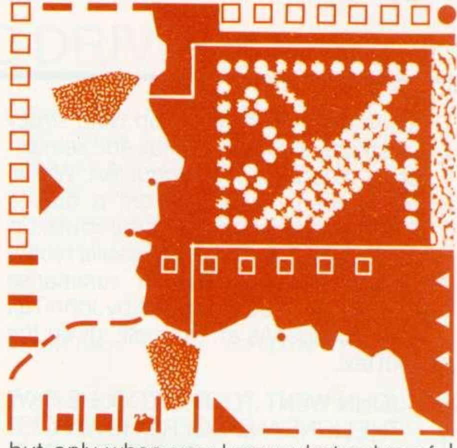
As a simple example consider the call OSARGS (&FFDA). This can be used to give information about the length and current PTR position of an open file. In addition, however, there is a useful operation which enables you to pick up the parameters associated with a ∗command. Suppose you wish to produce a new command, ' ∗WRITE this is the text' for example, whose purpose is to do just that. Listing 1 shows how OSARGS can pick up the argument 'this is the text', which is attached to the command ∗WRITE. OSARGS requires a parameter block of four bytes in zero page memory pointed to by the X register. Y is set to 0, and A contains the code 1. After calling OSARGS, the four-byte block contains the address of the parameter string, which in this example is then printed out using indirect indexed addressing (line 70). Type in the program and run it, ∗SAVEing the code as prompted. Then reload and run the code by typing

∗WRITE this is the text.

A more useful example is the use of the OSFILE (&FFDD) command. George Hill has already shown how this can be used to extract the load and execute addresses of a file legally (January issue, page 68), and the examples here show how it can be used to load a Basic program into memory at three different page values: that at which the program was recorded; at a given fixed value (&3000); and at the machine's OSHWM value, the value of page the machine adopts when first switched on. The program also contains some illegal code (just to keep things balanced!) which is used to reset PAGE and TOP directly (locations &18 and &12-&13) and to perform the function of the Basic OLD command. Finally, the Basic program is run by inserting RUN <CR> into the input buffer using OSBYTE 138. Purists among you will say, Why not reset page and top legally by inserting

PAGE = &xxxx <CR> and 0. <CR>

into the buffer as well? This can be done, but only when you know what value of page you want.



Listing 2 will load a Basic program called BASIC at the page value it had when it was recorded. To test it, first run the program to assemble code at &A00. Then set page to, say, &6000 and type in and save a short Basic program under the name BASIC. Push break to reset the machine, then type CALL &A00, whereupon the file BASIC should be reloaded and run at page &6000. Obviously, if you are using tape you will have to rewind it first.

To load and run the file BASIC at a given page (&3000 in my example) modify listing 2 by typing in the lines shown in listing 3. The main difference is that byte pb + 6 in the parameter block is now set to

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Listing 1. How OSARGS picks up the argument – for £ read #

```
10REM listing 1
20osargs=&FFDA
30osasci=&FFE3
40FORZ%=0TO3STEP3
50P%=&A00
60[OPTZ%
65\ set up parm. blk. at &70; use command A=1; see User Guide p.454
70LDA£1:LDX£&70:LDY£0:JSR osargs
75\ now output message pointed to by &70-&74
80.loop LDA(&70),Y:JSR osasci
90INY:CMP £&D:BNE loop
100RTS
110]:NEXT
120PRINT'" *SAVE WRITE A00 ";STR$~P%
```

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0, which means that the address in bytes pb+2 to pb+5 (&3000) is used when loading the file. Run the modified program to assemble code at &A00, and test it as before with the same Basic program. This time you will find that the Basic is executed at page &3000.

This method of loading a file to an address other than that at which it was recorded, using machine code, is sometimes used when loading commercial games programs to prevent copying.

To load the file BASIC at OSHWM, start with listing 2 again and type in the modifications shown in listing 4. Once again, the load address is specified by the OSFILE parameter block, but this time OSBYTE 131 is used to find the correct value for PAGE, which is returned in the Y register. The testing procedure is as before, but see that you have saved listing 2+4 before typing CALL &A00, as in this case the program BASIC will probably be run on top of it. page 59 ▶

Listing 2. Program loaded at the page value it had when recorded – for £ read #

```
Parameter block set up as follows:-

pb      pb+1     pb+2     pb+3     pb+4     pb+5     pb+6
Nlow    Nhigh    x        x        x        x        &FF

Nlow and Nhigh point to filename to be loaded, x means value doesn't
matter, &FF in pb+6 means use load address saved with file.

   10REM Listing 2
   20osfile=&FFDD:osargs=&FFDA
   30osasci=&FFE3:osbyte=&FFF4
   40FORZ%=0TO3STEP3
   50P%=&A00
   60[OPTZ%
   70LDA fname MOD256:STA pb
   80LDA fname DIV256:STA pb+1
   90LDX£ pb MOD256:LDY£ pb DIV256
  100LDA£&FF:STA pb+6
  110JSR osfile \A=&FF gives command read file; see User Guide p.455-6
  120LDA pb+3:STA &18:STA &13 \store page value at 'page' and 'top' (msb)
  130LDY£0:STY&12 \set 'top lsb' = 0
  140INY
  150.ny DEY:LDA (&12),Y:CMP£&D:BNE error \check for &D line terminator
  160INY:LDA (&12),Y:BMI endbyte \check for &FF (neg) prog. terminator
  170LDY£3:LDA(&12),Y:BEQ error \check ptr to next line not zero
  180CLC:JSR nxline:BNE ny \update pointer in &12,&13 to next line
  190.endbyte INY:CLC:TYA \Y set to point to byte after &FF terminator
  200JSR nxline \update &12,&13 as 'TOP'
  210LDA £138:LDX£0:LDY£ASC"R":JSR osbyte \insert RUN in buffer
  220LDA £138:LDX£0:LDY£ASC"U":JSR osbyte
  230LDA £138:LDX£0:LDY£ASC"N":JSR osbyte
  240LDA £138:LDX£0:LDY£&D:JMP osbyte \exit
  250.nxline ADC &12:STA &12 \update 'TOP' pointer
  260BCC skip
  270INC &13
  280.skip LDY£1:RTS
  290.error LDY£0 \error detected while linking program; print err. msg.
  300.nxchar LDA mess,Y:JSR osasci:INY:CMP£&D:BNE nxchar:RTS
  310.name:]
  320$P%="BASIC":P%=P%+LEN($P%)+1:REM program name is 'BASIC'
  330mess=P%:$P%="Bad Program":P%=P%+LEN($P%)+1:REM error message
  340pb=P%:REM parameter block start
  350NEXT
```

Listing 4. OSBYTE 131 is used to find the correct page value –for £ read #

```
Parameter block set up as follows:-

pb    pb+1   pb+2    pb+3 pb+4 pb+5     pb+6
Nlow Nhigh  LA-lsb  LA   LA   LA-msb   0

Nlow and Nhigh point to filename to be
loaded, LA is load address for file, 0 in
pb+6 means use load address in parameter
block.

   100LDA£0:STA pb+6
   102STA pb+2:LDA £&30:STA pb+3
   104LDA£&FF:STA pb+4:STA pb+5
   110LDA pb+3:STA &18:STA &13
   120LDA£&FF:JSR osfile \read file command
```

Listing 5. Current disc title and start-up option? –for £ read #

```
Parameter block set up as follows:-

pb     pb+1         pb+2    pb+3     pb+4
x      bufad-lsb bufad    bufad   bufad-msb

x value doesn't matter, bufad is buffer
address.

after calling OSGBPB the buffer contents are:-

buf                buf+1                ... buf+n
len. n of disc
name buffer      disc name start ... disc name end

buf+n+1
start-up option

This command is not documented in the User
Guide, but is mentioned in the Econet Manual
p38 and the Advanced User Guide p339-342

    10REM Listing 5
    20osgbpb=&FFD1
    30FORZ%=0TO3STEP3
    40P%=&A00
    50[OPTZ%
    60LDA£buf MOD256:STA pb+1:LDA£buf DIV256:
    STA pb+2
    70LDA£&FF:STA pb+3:STA pb+4
    80LDA£5:LDX£pb MOD256:LDY£pb DIV256
    90JSR osgbpb \A=5 gives read title command
   100RTS
   110.pb:]
   120buf=&AB0
   130NEXT
   140CALL&A00
   150PRINT"Disc title is ";
   160FORZ%=1TO?buf:PRINTCHR$(?(buf+Z%));:NEXT
   170PRINT'"Start up option = ";buf?(?buf+1)
```

Listing 3. Program loaded and run at a given page value –for £ read #

```
Parameter block set up as for listing 3,
but load address is set by osbyte 131 in
line 85.

    85LDA£131:JSRosbyte:STY pb+3 \see
    User Guide p.431
    90LDX£ pb MOD256:LDY£ pb DIV256
   100LDA£0:STA pb+2:STA pb+6:LDA£&FF:
   STA pb+4:STA pb+5
   110LDA pb+3:STA &18:STA &13
   120LDA£&FF:JSR osfile \read file command
```

Listing 6. Current drive and current directory? –for £ read #

```
Parameter block set up as follows:-

pb          pb+1        pb+2       pb+3       pb+4
x           buf-lsb    buf        buf        buf-msb

x value doesn't matter, bufad is buffer
address.

after calling OSGBPB the buffer contents are:-

buf                 buf+1               ... buf+n
len. n of disc
name buffer       disc name start ... disc name end

buf+n+1              buf+n+2
len.of Dir. name     Dir. name

    80LDA£6:LDX£pb MOD256:LDY£pb DIV256
    \A=6 gives read Directory command
    150PRINT"Disc drive is ";
    160FORZ%=1TO?buf:PRINTCHR$(?(buf+Z%));:NEXT
    170S%=buf+1+?buf
    180PRINT'"Current Directory is ";
    190FORZ%=1TO?S%:PRINTCHR$(?(S%+Z%));:NEXT
    200PRINT
```

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Enough of OSFILE. Another call worthy of investigation is OSGBPB. This is often dismissed as being relevant only where data file handling is required. However, this call can be used by disc users to provide legally some useful information about the disc. Listing 5 shows you how to find out what the current disc title (if any) and start-up option are, and making the changes to listing 5 shown in listing 6 will allow you to find out the current drive and current directory.

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Printer points

HERE are two utility programs to help you manage your printer more effectively. Both use another legal method of interacting with the operating system that has been exploited before in these pages: that of intercepting the vector for OSWRCH.

Listing 7 enables you to list a long program in pages, avoiding the perforations in fanfold paper. To use it, first run the program then load the program to be listed. Set up your printer top of form correctly and CALL &A00 immediately before typing LIST <ctrl B>. When the listing is completed type <ctrl C> and then type CALL &A22 to disconnect the handler again. The program works by counting carriage returns (&D) and sending a formfeed character to the printer (and screen) every 62 lines, thus allowing four blank lines for every 66-line page.

Listing 8 enables you to list programs that contain embedded mode 7 colour/graphics characters without the printer going bananas! It does this by the simple expedient of replacing any character code greater than 127 with a space (32) character. Once again, assemble the code and CALL &A00 before listing to the printer. Push break to reset the vector.

Listing 7. Avoiding the paper perforations – for £ read #

```
10REM PRNEWPAGE (C) R.NEWMAN 14/1/83
20WRCHVEC=&20E:REM see User Guide p 452
30FORZ%=0TO3STEP2
40P%=&A00
50[OPTZ%:.on \set up vector intercept
60LDA WRCHVEC:STA LSAVE:STA XX+1:LDA £START MOD256:STA WRCHVEC
70LDA WRCHVEC+1:STA HSAVE:STA XX+2:LDA £START DIV 256:STA WRCHVEC+1
80LDA £0:STA count
90RTS
100.off LDA LSAVE:STA WRCHVEC \restore original vector
110LDA HSAVE:STA WRCHVEC+1
120RTS
130.START PHA:CMP £&D:BNE OK:INC count:LDA £62:CMP count:BNE OK
140LDA £12
150.XX JSR &0000 \dummy address; replaced by old WRCHVEC contents
160LDA £0:STA count \reset counter after page eject
170.OK PLA:JMP (LSAVE) \exit down normal OSWRCH route
180]:LSAVE=P%:HSAVE=P%+1:count=P%+3:NEXT
190WIDTH79:VDU12
200PRINT"PRINT HANDLER INSTALLED:"''"CALL &";~on;" TO ACTIVATE"''
"CALL &";~off;" TO DE-ACTIVATE"
210PRINT''"N.B. WIDTH IS SET TO 79"
```

Listing 8. Mode 7 graphics characters made invisible – for £ read #

```
10REM Printer graphics stripper
20WRCHVEC=&20E:REM see User Guide p 452
30FORZ%=0TO3STEP3
40P%=&A00
50[OPTZ%
60LDA WRCHVEC:STA&70:LDA WRCHVEC+1:STA&71 \set up vector intercept
70LDA£START MOD256:STA WRCHVEC:LDA£START DIV256:STA WRCHVEC+1:RTS
80.START PHP
90CMP£&80:BCC OK \check for char.>127
100LDA£32 \replace char. >127 with space char.
110.OK PLP
120JMP(&70) \exit down normal OSWRCH route
130]:NEXT
```

SPACE SHUFFLE

An Acorn DFS utility that works out the number of disc sectors that can be retrieved and tells you how much storage is available altogether

FRESECT is a program that enables you to see how much space is left on a disc and how much more will be released if you compact the disc. It extracts information from the disc catalogue sector 1 on track 0 and calculations are then made to display information on how much of the disc space is allocated.

The utility is a step along the route mapped out by Joe Telford in the September 1983 *Acorn User,* where he explained a method for storing file information on the disc catalogue sectors and gave examples of how it may be extracted to good effect.

The program *(see page 66)* starts by asking which disc drive is to be selected (lines 50-80) and then uses PROCread to read the second of the two catalogue sectors, which contains all the file sector allocation information, into a buffer RDBUF%. This is accomplished by using the OSWORD call with A%=&7F and a parameter block RDBLOCK% (pointed to by X% and Y%) set up to read (command &53) track 0, sector 1. The structure of the parameter block is shown in figure 1.

DR contains the selected drive number. If an error has occurred after the OSWORD call the error byte will contain the error number (non-zero). This unlikely occurrence is dealt with by line 1050.

When a file is saved its name is added to the start of the list of files stored in the directory (unless it is small enough to fill up a gap left by a previous deletion). Thus the next sector to be allocated can be calculated by looking at the file information of the first file in the directory list. This is done by looking at the bytes with an offset of 15 (&F) to 12 (&C) in the buffer, which are read into the variables K1% to K4% respectively in line 110. The information is set out as shown in figure 2.

The length of the file in sectors is given by (K2% AND &30) *16 + K3% + (0 or 1), depending upon whether the low order byte K4% is 0 or not, since only whole sectors are allocated. Thus the length in sectors is calculated by the expression (K2% AND &30) *16 + K3% − (K4%<>0) since K4%<>0 is either true (−1) or false (0). If the start sector of the file (K2% AND &3) *256+K1% is added in then we get the expression in line 120 which calculates the next free sector.

Byte 0	1-4	5	6	7	8	9	10
drive	buffer address	number of parameters	command	track	start sector	length code	error code
DR	RDBUF%	3	&53	0	1	&21	0

Figure 1. Parameter block RDBLOCK%

&C (K4%)	&D (K3%)	&D (K2%) bits 4, 5	&D (K2%) /bits 0, 1	&F (K1%)
file length low order 8 bits	file length middle order 8 bits	file length high order 2 bits (K2% and &30)	/file start /high order /2 bits /(K2% and &3)	file start low order 8 bits

Figure 2. Bytes in the buffer with an offset of 15 (&F) to 12 (&C)

The number of files in the directory times eight is stored in the byte with offset 5 in the buffer. This is read into NE% in line 130, line 140 printing out appropriate information.

If there are no files in the directory, then the calculations done using K1% to K4% will be incorrect, and this is allowed for by line 150, which adjusts FS%, the first free sector variable to equal 2, sectors 0 and 1 having been allocated to the catalogue.

The bytes with offset 6 and 7 in the buffer contain the number of sectors formatted on the disc (low eight bits in offset 7, and two high bits in bits 0 and 1 of offset 6). These are combined in line 160, which checks whether the last sector on the disc has been allocated by seeing whether FS% = 256*(RDBUF%?6 AND 3) + RDBUF%?7. If FS% is bigger than this value then an error has occurred, and the program is stopped in line 170. This line was included during the development of the program, and it should be redundant now. If the disc is not full then line 180 calculates the number of sectors left free on the disc and displays the results.

However, some programs may have been deleted and there may be gaps within the normally continuous allocation of file sectors. This is explored by PROCgap, which works out how many sectors could be retrieved if the disc was compacted. It first checks whether the disc is empty by checking the number of file entries and issuing an appropriate message (line 2010). It then adds up the lengths of all the files on the disc (stored in the variable S%), divides it by &100 to obtain the number of occupied sectors, and compares the result with FS%. Any discrepancy equals the number of sectors that can be retrieved and added to those remaining at the end of the disc by a *COMPACT command, which reallocates the files stored on the disc so that they are stored end-to-end without intervening sector gaps.

S% starts at &200 because of the two catalogue sectors, and point% is adjusted to point to the last files information 'block' which is offset (eight times the number of files on the disc) into the buffer. This information is contained in the byte offset 5 into the buffer, and the pointer is set up in line 2020. There follows a REPEAT... UNTIL loop (lines 2030-2070),

page 66 ▶

counting the cost of accounting?

Harrison Associates, the business software systems house who specialise in ledger systems and financial planning packages, now offer EASY JUNIOR, the integrated accounting system, on the BBC micro with Torch Disk-Pack. In upgrading your Model B to a full business micro, EASY JUNIOR gives SALES LEDGER, PURCHASE LEDGER, STOCK CONTROL, INVOICING and NOMINAL LEDGER in a totally integrated form and driven by a master program, the system can be driven in its entirety or just as easily with one or more of the five modules.

The EASY integration means that, for example, the raising of an invoice will automatically adjust the relevant entries in sales ledger and stock control. And with features such as ★ EASE OF USE, ★ SECURITY, ★ RELIABILITY, ★ AUDITABILITY, ★ SUPPORT AND MAINTENANCE and ★ WELL DOCUMENTED TRAINING coupled with an attractive price of less than £300 EASY JUNIOR is the ideal small business tool. Written by Scorpion Computing, EASY JUNIOR is a subset of EASY, one of the fastest selling integrated accounting packages in the UK and gives access to local and remote, multi user networking.

EASY JUNIOR is also available on all TORCH "C" series microcomputers and the APRICOT.

For more information on EASY JUNIOR, EASY, TORCH Computers and BBC upgrades post the coupon today or 'phone asking for Barrie or the sales team.

```
SALES LEDGER — Add Customers                         24.03.84
Account Number        [ AD001 ]
Customer Name         [ ADAMS REMOVALS LIMITED              ]
Address Line One      [ 24 COLLIERS ROW                     ]
        Line Two      [ FRIMLEY                             ]
        Line Three    [ CAMBERLEY  ]
        Line Four     [ SURREY     ]
Post Code             [ GU11 1lZ ]
Telephone Number      [ 0276 44533     ]
Contact Name One      [ DAVE ADAMS     ]
             Two      [                ]
Price Discount        [ 00.00 ]
Credit Limit          [ 5000   ]        Customer Analysis Code [ 02 ]
All Correct?  Y or N [ Y ]
```

Sales Ledger.
Keeps track of your customers, how much they owe, how long for and how much VAT you have collected. Invoices, credit notes (both linked to stock records) and statements can be raised and printed.

```
STOCK CONTROL — Enquiries                                        24.03.84
Item Number           [ FURN 001 ]
Item Description      [ DOUBLE PEDESTAL DESK  ]
Unit of Measure       [ EACH     ]
Standard Cost Price   [ 0100.00  ]             Selling Price [ 0150.00 ]
Weighted Cost Price   [  100.00  ]
Last Cost Price       [  100.00  ]
Sales Analysis Code   [ 06 ]                   Purchase Analysis Code  [ 06 ]
Safety Stock          [        12 ]
Lead Time in Days     [ 45 ]
Supplier Account No.  [ MILLS    ]
Alternative Supplier  [          ]
                        Units        Value
Sales This Period     [ 00006 ]   [  900.00 ]
Sales Year to Date    [ 00012 ]   [ 1800.00 ]
Balance on Hand       [        12 ]            Awaiting Invoice [ 000000 ]
All Correct?  Y or N  [ Y ]
```

Stock Control.
Keeps track of stock levels and prompts re-ordering automatically. Can also be used as a standard costing system or last or weighted average cost system.

```
PURCHASE LEDGER — Post Invoices                              24.03.84
Account Number      [ AD001 ]
Supplier Name       [ MILLS                       ]
Invoice Number      [ 000079 ]     Date  [ 24/03/84 ]
 Analysis  Description          Goods     VAT    Value       Total
 [ 06 ]   [ FURNITURE   ]  [ 0500.00 ]  [ 1 ]  [ 0075.00 ]  [  575.00 ]
 [ 03 ]   [ ANCILLARIES ]  [ 0130.00 ]  [ 1 ]  [ 0019.50 ]  [  149.50 ]
 [    ]   [             ]  [    .    ]  [   ]  [    .    ]  [    .    ]
 [    ]   [             ]  [    .    ]  [   ]  [    .    ]  [    .    ]
 [    ]   [             ]  [    .    ]  [   ]  [    .    ]  [    .    ]
 [    ]   [             ]  [    .    ]  [   ]  [    .    ]  [    .    ]
 [    ]   [             ]  [    .    ]  [   ]  [    .    ]  [    .    ]
 [    ]   [             ]  [    .    ]  [   ]  [    .    ]  [    .    ]
                           [ 0630.00 ]         [ 0094.50 ]  [  724.50 ]
All Correct?  Y or N  [ Y ]
```

Purchase Ledger.
Keeps track of your debts and VAT position. Prints (single key-stroke basis) purchase invoices, credit notes and supplier statements.

```
SALES LEDGER — Invoices and Credits                            24.03.84
Account Number      [ AD001 ] ADAMS
Customer Name       [ ADAMS REMOVALS LIMITED              ]
Address Line One    [ 24 COLLIERS ROW                     ]
        Line Two    [ FRIMLEY                             ]
        Line Three  [ CAMBERLEY  ]
        Line Four   [ SURREY     ]
Post Code           [ GU11 1lZ ]
Invoice (I)          I (Credit)
or Credit (C)       [ I ] Invoice Number [ 000079 ]  Date [ 24/03/84 ]
Ageing Period       [    ]  (Only displayed if a credit)
Reference           [ AD/27/497                ]
Discount %          [ 00.00 ]  (Deducted from invoice total)
All Correct?  Y or N  [ Y ]
```

Invoices.
Issues customer invoices and records supplier invoices and credit notes.

EASY JUNIOR FROM



Unit 307, 16 Brune St, London E1 7NJ. Tel: 01-377 1630

My particular interest is ____________________

____

Name: ____________________

Position: ____________________

Company name: ____________________

Address: ____________________

____

Tel: ____________________

```
   10REM FRESECT: Shows disk free space
   20REM (c) R.Newman Oundle School
   30REM Acorn User 1984
   40DIM RDBLOCK% 11,RDBUF% &100
   50CLS
   60PRINTTAB(3,2)"D I S K   I N F O R M A T I O N
"''
   70PRINT"TYPE DRIVE REQUIRED (0-3) ";
   80DR=GET:IF ((DR-48)*(DR-49)*(DR-50)*(DR-51)) T
HEN GOTO 80 ELSE PRINTCHR$(DR):DR=DR-48
   90SCT=1:TNUM=0:SIZNUMRWV=&21
  100PROCREAD:REM read in catalogue info
  110K1%=RDBUF%?&F:K2%=RDBUF%?&E:K3%=RDBUF%?&D:K4%
=RDBUF%?&C
  120FS%=(K2% AND 3)*256 +K1% +(K2% AND &30)*16+K3
%-(K4%<>0):REM next free sector
  130NE%=RDBUF%?5/8:REM number of cat. entries
  140PRINTTAB(0,7)"Catalogue entries:- ";NE%;TAB(2
4);"filled"'TAB(20);31-NE%;TAB(24);"vacant"''
  150IF NE%=0 THEN FS%=2
  160IF FS%=256*(RDBUF%?6 AND3)+RDBUF%?7 PRINT"Las
t Sector Allocated"':PROCgap:END
  170IF FS%>256*(RDBUF%?6 AND3)+RDBUF%?7 VDU7:PRIN
T"Program error!":END
  180PRINT"First free sector:- ";FS%;TAB(24);"(wit
hout"'TAB(24);"("'"sectors left:-         ";256*(RDBU
F%?6 AND3)+RDBUF%?7-FS%;TAB(24);"(compacting"'
  190PROCgap
  200END
 1000DEFPROCREAD
 1010?RDBLOCK%=DR:RDBLOCK%!1=RDBUF%:RDBLOCK%?5=3:R
DBLOCK%?6=&53
 1020TR=RDBLOCK%+7:SR=TR+1:CR=TR+2:ERN=TR+3
 1030?TR=TNUM:?SR=SCT:?CR=SIZNUMRWV:?ERN=0
 1040X%=RDBLOCK%:Y%=RDBLOCK% DIV256:A%=&7F:CALL&FF
F1
 1050IF ?ERN<>0 THEN VDU7:PRINT''"Disk Error ";~?E
RN;". Program Aborted"'':END
 1060ENDPROC
 2000DEFPROCgap
 2010IF RDBUF%?5=0 THEN PRINT"Empty Disk"':ENDPROC
 2020S%=&200:point%=RDBUF%+RDBUF%?5
 2030REPEAT
 2040IF ?(point%+4)<>0 THEN L%=&100 ELSE L%=0
 2050L%=L%+256*?(point%+5)+256*16*(?(point%+6) AND
 &30)
 2060S%=S%+L%
 2070point%=point%-8:UNTIL point%=RDBUF%
 2080PRINT"Compacting will restore ";FS%-S% DIV 25
6;" sector";:IF FS%-S% DIV256<>1 PRINT"s"' ELSE PR
INT'
 2090ENDPROC
```

which works out the length of each file and stores it in L% and then cumulates the total length in S% (line 2060).

This process works as follows: line 2040 checks the low-order eight bits of the file length, and allocates &100 bytes (one sector) to L% if the answer is not 0. Line 2050 calculates the number of complete sectors in the file as described previously. When each file's length has been calculated and added onto S% the pointer is decremented by eight to point to the previous file's information block, and the loop repeats until it reaches the start of the buffer.

Finally, line 2080 calculates and displays the number of sectors that could be restored.

The BBC Micro can now give your children a private education.

The BBC Microcomputer now accounts for 80% of the omputers being ordered under the current D.O.I. Primary chool Scheme.

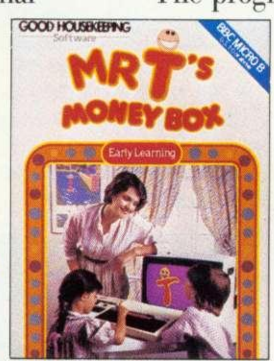
It's also the computer which a rapidly increasing umber of people are choosing for their homes.

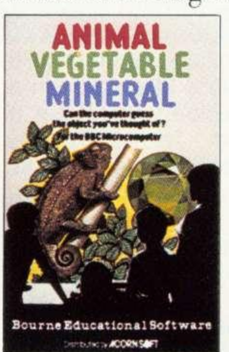
One of the reasons for its success is that it makes earning highly entertaining for everybody. From children who are getting to grips with the alphabet, to adults who vant a gentle but intensive introduction to the complex vorld of computing.

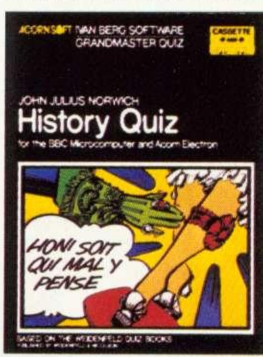
Now, there's a substantial new catalogue of educational rograms specially for the BBC Microcomputer.

It has been developed by corn soft, the software division of corn Computers who manufacture he BBC Micro.









Making faces without getting scolded.

With the new Facemaker rogram, your children can make ver a million faces. It's like an identi-kit, allowing them to epict anyone they want. They start by choosing the eyes. hen they can choose the mouth, the ears, the nose, the acial outline and the hairstyle.

And if they really fancy dressing up, they can add arrings and hats.

In doing all this, they learn to read and spell, as well as eveloping their powers of description.

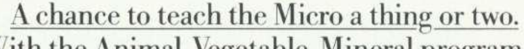
The money program, two games for the price of one.

Mr. T. is an engaging little figment of the microchip vho can teach your children all the complexities of our oinage system.

His Money Box program has two games, each of which an be played at different levels.

In Money Match, the challenge is to collect a set of oins, matching them according to shape, size and value.

In Money Box, you can give your child and Mr. T. a elping hand to get all the coins on the screen into the box. t's always different, because the coins on the screen are ased on the small change you have to hand.)



A chance to teach the Micro a thing or two.

With the Animal, Vegetable, Mineral program, the children can get the computer guessing.

They think of an object. The BBC Micro has to decide what it is.

If it doesn't come up with the answer, the children can keep giving it hints.

In doing so, they are encouraged to question the difference between such things as crocodiles and alligators, or whether oil is vegetable or mineral.

The program also encourages them to consult reference books so that they can ask the computer increasingly tough questions.

Questions on Julius Caesar from J. Julius Norwich.

John Julius Norwich's History Quiz is one of the new BBC Micro Grandmaster quiz series which also covers theatre, crime and detection, music, science fiction and royalty.

On the history front, there are 300 brain-testing questions, covering all aspects of British history from Julius Caesar to Margaret Thatcher.

And to increase the educational value, Mr. Norwich has posed the questions from angles which will give a broader understanding of events.

For the full catalogue, clip the coupon.

There are thirty more new BBC Micro programs in Acornsoft's new catalogue.

For a free copy, complete the coupon, or telephone 0933-79300. Or ask your local BBC Micro dealer.

If you're not yet a BBC Micro owner, you can get full details of the computer at the same time.



To Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Please send me the new Acornsoft catalogue "At Home With The BBC Microcomputer."

I would also like details of the BBC Micro ☐ (tick)

Name__________

Address__________

Postcode__________

AC 13

ACORNSOFT

... Next morning Joe Telford laid aside his darts to analyse the matches of the night before. His Beeb played the role of ...



THE SOBER STATISTICIAN

THIS month's jottings result from a deep philosophical discussion in a place of intellectual retreat, not a stone's throw from Telford Towers. Among its many facilities, the P&G, as locals call it, has a darts board, around which our tale is set.

It began one evening as I sat in a quiet corner slurping my usual barley water (suggested as a relaxant by Barry Pickled). The usual gang of P&G intellectuals then trooped in, to ritual changes of 'gisagamerdarts'. Now this particular night turned out to be rather interesting, partly because of the quality of the barley water but also because a number of ladies were playing darts, with varying degrees of success.

After a while, Bill pointed out that games between men were usually short; those between ladies were often quite long, and those between ladies and gents were almost as long. Bill therefore hypothesised that the men were scoring less on each throw when playing a lady opponent.

This seemed tantamount to discrimination, but each male strongly denied throwing less accurately. Bernie, who is something of a thinker, suggested keeping an average score: so he was given a beer mat, a pen, a place near the board, and told to get on with it.

By the end of the evening, Bernie had completely covered the mat with ink, producing the following:

Player	Av. score vs men	Av. score vs ladies
John 1	45	38
John 2	53	54
Bernie	56	43
John 3	57	45
Tony	60	—
Mike	62	57
Ian	62	54
Bill	70	59
Brian	72	58

The results were based on averages obtained over several games, and did not take finishing scores into consideration. Tony's second score was not included as he left before playing a lady opponent. The two sets of scores certainly seem to justify Bill's theory, but once back at Telford Towers, I determined to check the figures mathematically.



Because statisticians have a reputation of being able to prove anything with a set of figures, I consulted the only honest broker I know, the BBC micro. I realised I would need to write at least one program, and because of the general-purpose nature of statistics I decided to plan out one initial stats package that could be applied again later. Figure 1 shows the prototype software system components. I decided that a pack on a particular area would be more useful to me than a general-purpose package that tried to do everything at once.

The prototype package was designed to work with discs, but only slight changes are needed to use cassettes, and these are pointed out later.

I decided that this first package would be based around four main facilities, of which only two would actually deal with any statistics – my philosophy is 'Get the data right and the rest is easy', for an ordered approach to data entry and file handling always pays off. My five main programs *(see yellow pages ix-xi for listings)* were therefore:

1. Namefile entry program: generates a single file containing the names of people or items. The initial entry in the file is itself a number, indicating the number of names following.

2. Numberfile entry program: uses the namefile to create another file containing numbers which are related in some way to each name in the namefile. For the purposes of the pack, this must be used twice, to generate two files of data.

3. Correlation program: uses the two number files and calculates the 'product moment correlation coefficient' (more about this later).

4. Line of best fit program: calculates the equation of the 'line of best fit', using the 'least squares' method from the two number files. In addition, it can use this information to predict a value in one file from a matching value in another.

5. Menu program: this can really work only with discs. A suitable !BOOT file allows it to be selected on SHIFT-BREAK and gives quick access to any of the other four programs.

Listing 1 is the namefile entry program. Once typed in and saved it can be run. Follow the instructions to create a name-

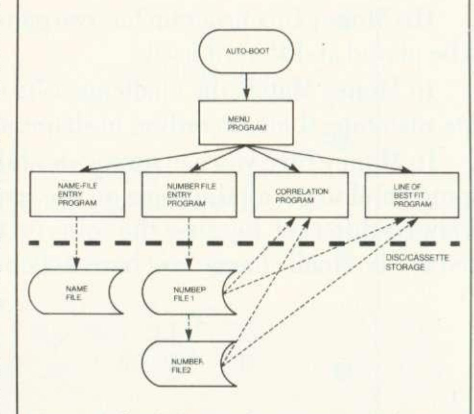


Figure 1. Statistics package system software

file, and be particularly careful that your last entry is 'END'. In selecting a name for the file, disc users should remember to differentiate between Basic programs and data files by giving a 'D.' extension to the file name, though this is optional. When the 'Done' message appears your namefile has been written to disc.

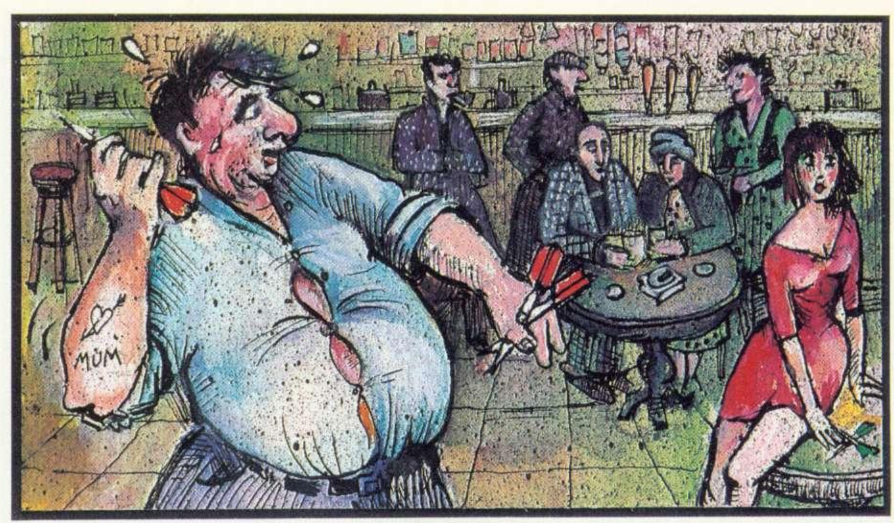


Figure 2 shows the structure of the namefile program. Using this with Listing 1, we can see how simply the program works. The main body segment allows a user to enter name data, although there is no error checking, nor is it possible to correct a file once saved. Users handling large files might find the extra effort involved in adding these facilities worthwhile. They should, however, consider whether any additions would best be done separately, ie as an amend-file program.

To use the program with a cassette recorder, several changes need to be made to the file handling procedure. Convert line 300 to:

```
300 VDU26,12
```

missing out the '*.' which is only useful on disc systems. Replace lines 350, 360, 370 with one line:

```
350 F$=FN filename
```

There should be no chance of overwriting a file if each is placed on a separate cassette.

Note the use of VDU28 and VDU26, which create variable-sized text windows, making layout easier to handle. The 'space' and 'dblht' procedures are common to all the programs.

Listing 2 is the numberfile entry program. Once typed in and saved, run it and follow the instructions to create a numberfile.

On a disc system the directory for drive 0 is shown, and the namefile for this run is requested. Once typed, each person's name appears, followed by a prompt for the user to enter the first piece of numerical data. This continues until the last name appears. The program then requests a name for this numberfile. When the name is typed the file is saved as a series of figures, prefixed by another number indicating how many numbers there are in the file. No correction or amendment facility is built in, but it could be added. This is necessary only in very long files, as an incorrect file could be deleted and re-entered. To differentiate between namefiles (extension 'D.') and numberfiles, it may be useful to give numberfiles the extension 'N.'.

Figure 3 shows the structure of the numberfile program and, using this with listing 2, we can see how the program works. It is only slightly longer than program 1. Again, use is made of windowing, and the program is generally sequential. Users should notice the difference between FNgetnamefile and FNfilename. FNgetnamefile (lines 480 to 550) gets the number of elements in the namefile so the appropriate list sizes can be dimensioned. It calls FNfilename (lines 300 to 340), which asks for and returns the user's file name. This utility is called on twice: once before loading the namefile and again just before saving the numberfile itself.

The same alterations for cassette users apply to this program as to program 1. Alter line 310 to:

```
310 VDU26,12
```

to remove the '*.' cataloguing call. Replace lines 490, 500, 510 and 520 with:

```
490F$=FNfilename ("Name")
```

and lines 360, 370 and 380 with:

```
360F$=FNfilename ("Number")
```

This stops the computer trying to open cassette files, which can much more easily be controlled by the insertion of the appropriate cassettes.

Having produced two programs, my next task was to set up the information from the beer mat (still wet) into appropriate files. I CHAINed program 1 and began entering names:

John 1
John 2
Bernie
John 3
Mike
Ian
Bill
Brian
END

Remember to add the word END in capitals as the final name. I did not enter Tony's name at this point because I didn't have his complete scores. Next, I selected an imaginative finename, 'D.DARTS', and saved the file to disc.

'I decided to plan out one initial stats package that could be applied again later'

The next stage was to create two files of numbers using program 2. This was chained and the filename 'D.DARTS' given. The program then loaded the filename and prompted me for each person's numbers. On completion I was asked for a filename for the numberfile, which I had just entered. After typing 'N.MEN' the file was saved to disc. This process was repeated, so that the scores against the ladies could be entered and filed as 'N.LADIES'. I was now ready to compare the two files. However, I needed an appropriate statistical method.

How these two sets of numbers are related can be measured. This measurement is called the coefficient of correlation, and is given the symbol 'r'. The value of 'r' is always between +1 (perfect positive agreement) and −1 (perfect negative agreement). A value of 0 indicates no correlation. For example, the closer 'r' is to +1 the closer I would be to proving Bill's hypothesis. The closer 'r' is to −1 the closer I would be to proving the

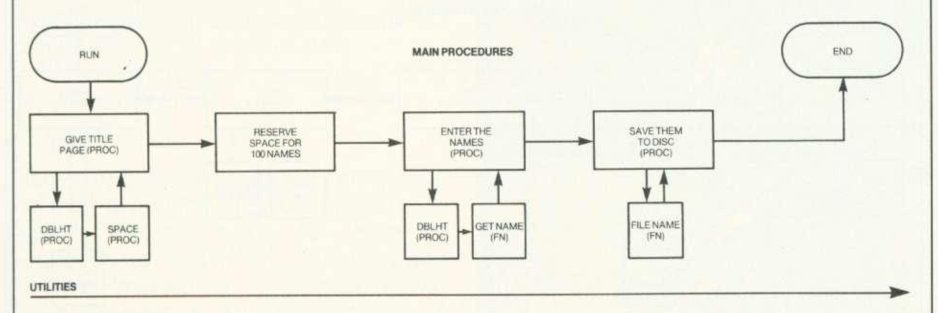
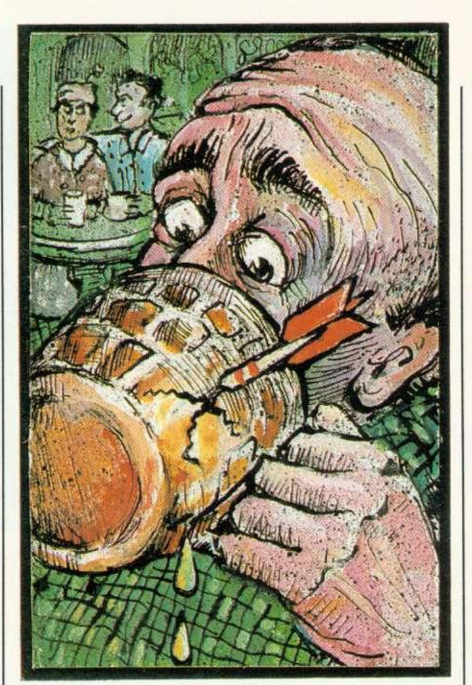


Figure 2. Structure of namefile program

opposite of Bill's hypothesis (ie, that men actually score higher when playing ladies). The closer 'r' is to 0 the more likely it would be that there is nothing in the figures to suggest that the men score differently according to the sex of the opponent.

Correlation can be used to measure relationships between sets of numbers in almost any situation. One common use of it is in comparing marks between sets of students, though it can just as easily be used to help standardise the marking of examiners. Another application is in comparing weight and size of people, and animals. Many questions beginning 'Is there a relationship between ...' can be at least partly answered by finding a correlation coefficient.

Finding the coefficient of correlation is best done by using a suitable formula *(see panel below):*



$$r = \frac{Total * SigmaXY - SigmaX * SigmaY}{SQR((Total * SigmaX2 - SigmaX^2) * (Total * SigmaY2 - SigmaY^2))}$$

Now don't be put off! We're not going to prove the validity of this formula, but we should be aware of how it is used. First, let's sort out what all the terms in the formula mean: imagine we wish to find the correlation coefficient of two sets of four simple numbers.

	Set X	Set Y
Item a	1	4
Item b	2	5
Item c	3	6
Item d	4	7

Then:

- Total – Number of items in each set (4).
- SigmaX – Total of all numbers in the X set.
- SigmaY – Total of all numbers in the Y set.
- SigmaXY – Total of all products of matching elements in each set.
- SigmaX2 – Total of all squares of set X.
- SigmaY2 – Total of all squares of set Y.

Calculating these values for the four item sets above is simple, and can make use of a table:

	X	Y	X^2	Y^2	X*Y
Item a	1	4	1	16	4
Item b	2	5	4	25	10
Item c	3	6	9	36	18
Item d	4	7	16	49	28
	10 Sigma X	22 Sigma Y	30 Sigma X2	126 Sigma Y2	60 Sigma XY

The results of the table can be fed into our original equation to give:

$$r = \frac{4 * 60 - 10 * 22}{SQR((4 * 30 - 10^2)) * (4 * 126 - 22^2))}$$

so

$$r = \frac{240 - 220}{SQR((120 - 100) * (504 - 484))}$$

and

$$r = \frac{20}{SQR(20 * 20)}$$

$$r = \frac{20}{20} = +1 \text{ (Perfect positive agreement)}$$

The mathematics shown above are relatively simple, but could become tedious if more items were added to the sets, or if the numbers were less easy to handle. What is required is a program that will take two numberfiles and produce the coefficient of correlation directly from them, whatever their length and complexity. It needs to: work with the file formats previously used in program 2; reject pairs of numberfiles with unequal numbers of items; produce all the sigma values required in the table above; and use these values to solve the equation.

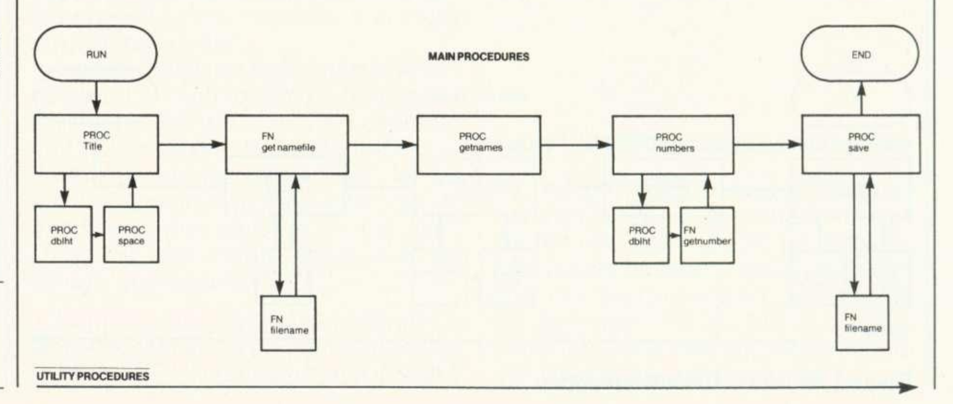
Listing 3 calculates the correlation coefficient. After being typed into the computer and saved it can be run. It asks for the names of two numberfiles, and the file nominated as the X set should be entered first. After loading these two files it quickly produces the coefficient of correlation.

Figure 4 shows the structure of program 3, and provides an insight into its construction. This program has a similar file-handling section to the previous programs. Because of disc speed we read both number files completely into memory before checking their length. This was designed to make cassette conversion easier. Readers with discs who appreciate more elegant programming can alter the appropriate sections of the program to read the first piece of data from both files then to decide whether to continue and read both files, or to reject them.

The correlation procedure (lines 150 to 340) follows the manual approach shown previously. The one exception is that the variable 'Total' is actually shown as 'Total1' in the program, to maintain the relationships between the two numberfiles. The program calculates 'r' to three decimal places, performing one piece of error checking, for division by zero, in line 290. Zealous readers may wish to include some kind of out-of-range check before performing the SQR operation of line 280. Attempting to take the square-root of a negative number will of course crash the program, though this should not normally occur.

Converting to cassette is simply a case of performing our usual alterations.

Figure 3. Structure of numberfile program



'Many questions beginning "Is there a relationship between . . ." can be at least partly answered by finding a correlation coefficient'

Change line 360 to

```
360 VDU26,12
```

to lose the cataloguing feature. Replace lines 410, 420, 430 and 440 with:

```
410 F1$=FNfilename (1)
```

Replace lines 530, 540, 550 and 560 with:

```
530 F$=FNfilename (2)
```

Running the correlation program on the darts statistics produced a moderately high correlation of +0.829, apparently proving Bill's theory. When I showed the results to the P&G intellectuals, one pointed out that Tony's scores had not been included. When I explained why his one score had not been added, the group tried to predict the score he might have made against a female opponent. This ranged from an optimistic 180 (from Tony) to a more plausible 26 from Marina. I had, however, already considered this problem and had devised a program to provide a possible solution.

Figure 5 is a 'scatter diagram', a graph designed to show the distribution or pattern of points made by plotting pairs of numbers. Here it shows the points produced by our darts example. If we try to fit these points onto a straight line that most closely represents their relationship, then any one of the three lines shown is a possible contender – and readers could add further lines, judging by eye.

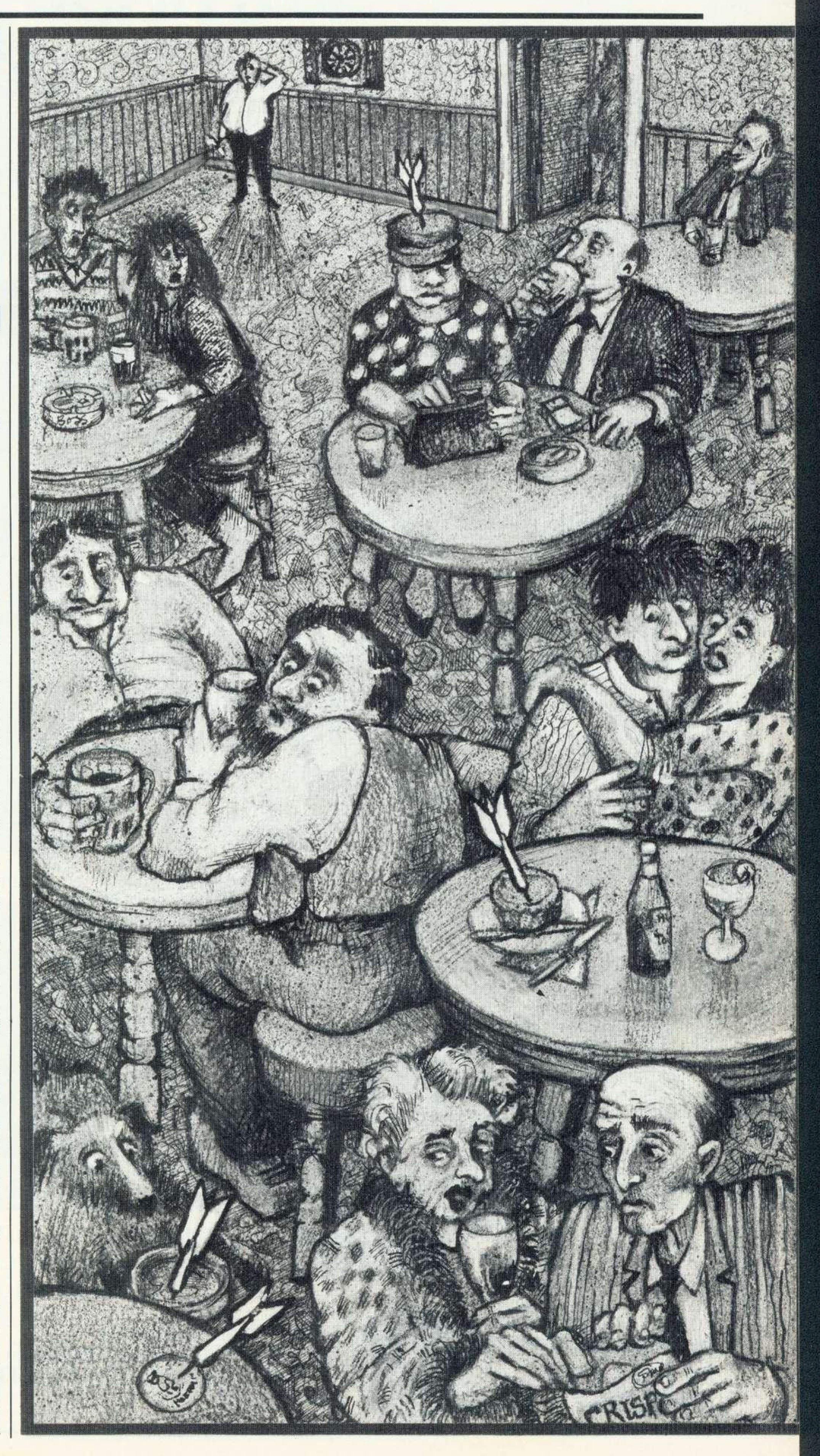
Rather than rely on this method, it is possible to use the data given previously to find this line using the 'least squares' method. It involves finding a line through the points so that the total of the squares of the vertical distances of the points from that line is a minimum (sometimes called a regression line, or line of best fit).

Any straight line can be represented by a general equation:

$$y = mx + c$$

where m gives the gradient or 'steepness' of the line and the value of c is where the graph cuts the y-axis. To define an equation we need to find values for m and c. When inserted into the formula they will give the equation of the regression line. It

page 79 ▶



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More Programs... m

Gemini Serious Software

Database

The Gemini Database Management System is a program designed to enable the user to store all types of information in similar format to a card indexing system. The program will ask you for the headings under which you wish to store the information on a 'card', i.e. for a record collection database these might be 'Artist', 'Song', 'Composer', etc., or for example in a database set up for a business application, a set of headings could be 'Name', 'Age', 'Salary', 'Department', 'N.H.I. Number', etc.

Having set up your fields, you may then add information to the 'cards' under the headings you have elected. Gemini databases contain other important and useful utilities as well, e.g. alphabetical and numerical sorting, numeric calculations, finding records that meet specific requirements, line printer routines, browsing facilities, etc.

Strongly recommended as an invaluable program for home, business or educational requirements.

```
DATABASE COMMANDS

A - ADD RECORDS TO FILE
B - BYTES FREE
C - CALCULATIONS
D - DELETE A RECORD
E - EXIT PROGRAM
F - FIND RECORDS
L - LIST FILE
M - MODIFY RECORD
N - NEW FILE
P - PRINT FILE
S - SORT FILE
W - WRITE FILE ON TAPE

** 3 RECORDS ON FILE **
** 996 RECORDS REMAINING **

ENTER OPTION
```

Spread Sheet Analysis

```
POSITION A1  RC      SPACE 5185      T
   ||      A          ||   B  ||   C ||
1   >J.B. SNOOKER T/A POT+BLACK
2   PROJECTED CASH FLOW   YEAR   ENDED
3
4                          Oct.   Nov.
5                            £      £
6   INCOME
7   Sales                 11786  10944
8                         -----  -----
9
10  REVENUE EXPENDITURE
11  Purchases               500    500
12  Advertising             500   1000
13  Director's salary      1596   1596
14  Salaries               2216   2216
15  Rent
16  Telephone                      300
17  Insurance                      200
18  Printing,stationery            400
19  Repairs & renewals
20  Hire of equipment        60     60
COMMAND BCDEFGPRSTW#?
```

Perhaps the most commercially successful item of business software yet written, the Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If, say, the cash receipts for January need to be changed, it would normally be necessary to delete and re-calculate several figures for each successive month.

With SPREAD SHEET, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulæ cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs.

SPREAD SHEET has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Full printer facilities are included which allow for either the table to be printed or just the data and formulæ relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. The sister program GRAPHPLOT will take data from disk or tape files created by this program to provide data portrayal in graph, histogram or pie chart format.

SPREAD SHEET ANALYSIS - *"... Well document... easy to load, excellent screen display."* — Home Computing Weekly.

Mailist

```
HUBBARD, DALE J.
MANAGING DIRECTOR
GEMINI MARKETING LTD.
 Address (1)
 Address (2)
 Town/City
 County
 Post Code
 Telephone       10/ML /    Searchkeys

HUBBARD, DALE J.
MANAGING DIRECTOR
GEMINI MARKETING LTD.
```

A superb dedicated database to allow for manipulations of names and addresses and other data. Gemini's unique 'searchkey' system gives you a further ten 'user-defined parameters' to make your own selections. Features include the facility to find a name or detail when only part of the detail is known, it will print labels in a variety of user specified formats.

MAILIST - *"A very professional piece of softwa...* —Which Micro.

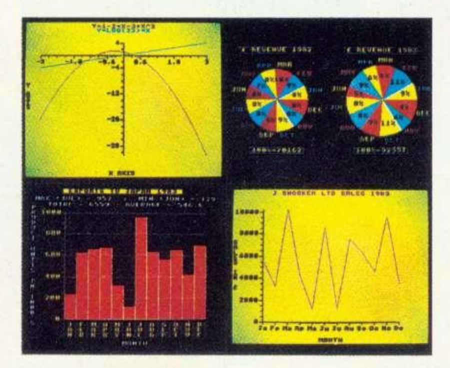
"Friendly and well designed - a pleasure to use - remarkable software." — The Scotsman

TOTALS	ESTIMATE	ACTUAL	SURPLUS
MORTGAGE	711.35	487.18	224.17
H.P.	750.08	611.37	138.71
MAINTENA	566.73	724.58	157.85
RATES	690.34	642.71	47.63
INSURANC	414.62	708.36	293.74
HOUSEKEE	598.51	662.14	63.63
MOTORING	478.37	556.58	78.21
ELECTRIC	469.04	564.21	95.17
GAS	488.84	622.04	133.20
SUBSCRIP	443.63	604.15	160.52
TELEPHON	468.85	603.03	134.18
ENTERTAI	589.34	506.01	83.33
SCHOOLIN	565.17	809.10	243.93
MEDICAL	603.82	482.72	121.10
LEGAL	743.28	779.96	36.68
CLOTHING	656.50	610.43	46.07
PAPERS	395.35	654.62	259.27
HOLIDAYS	734.55	681.51	53.04
COMPUTIN	487.64	588.47	100.83
SUNDRIES	773.27	443.75	329.52
TOTALS >	11629.28	12342.92	713.64

Home Accounts

Designed as a complete Home Accounting package this program allows the user to set up a budget for items of household expenditure and compare actual expenditure with budget. A running total of all surpluses and deficits is available both as digits, and in the form of a bar chart.

A complete Bank account routine is included together with suggested expenditure categories such as mortgage, rent, rates, telephone, gas, electricity, etc, however, these may be deleted or augmented without difficulty.



Graph Plot

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs... for easier visual comparison and assimilation.

GRAPH PLOT also incorporates a built in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Spread Sheet Analysis and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

GRAPH PLOT —*"Excellent displays with high resolution and good colour co-ordination"* — The Micro User.

ore Programs... more

Business Software

J. B. SNOOKER T/A POT BLACK	1983	1982
BALANCE SHEET AT 31/12/83	£	£
Fixed Assets	50500	30950
Goodwill	2000	2000
	52500	32950
CURRENT ASSETS:		
Stock & WIP	5000	3000
Debtors & Prepayments	2000	4000
Cash in Hand	500	200
VAT recoverable	500	
	8000	7200
LESS CURRENT LIABILITIES:		
Trade Creditors & Accruals	9300	3300
H.P.	800	1000
Bank Overdraft	33900	8250
VAT payable		600
	44000	13150
NET CURRENT ASSETS/(LIABILITIES)	(36000)	(5950)
NET ASSETS/(LIABILITIES)	£ 16500	£ 27000
REPRESENTED BY:		
Capital A/c (1)	13200	16000
Capital A/c (2)	(700)	6000
Long Term Loans	4000	5000
	£ 16500	£ 27000

NOTES TO THE ACCOUNTS - 31/12/83

1. FIXED ASSETS:

	Land & Buildings £	Motor Vehicles £	Plant & Equipment £	TOTAL £
Cost or Valuation	50000	4000	2500	56500
Acc. Depreciation	5000	500	500	6000
NBV — 1983	£45000	£3500	£2000	£50500
NBV — 1982	£25100	£3700	£2150	£30950

2. LAND AND BUILDINGS:

Land and buildings comprise:	1983 £	1982 £
Freehold Property	20000	
Leasehold Property	25000	25100
	£45000	£25100

3. CAPITAL ACCOUNTS:

	(1) £	(2) £
Opening Capital	15000	5000
Add: Capital Introduced	500	0
Profit/(Loss) for Year	6300	6300
	21800	11300
Less: Drawings	(8600)	(12000)
	£ 13200	£(700)

Final Accounts

Requires Cash Book module. This program will take your cash book data to the logical conclusion of balance sheet, trading and profit/loss account and notes to the accounts i.e. fixed assets, land and buildings and capital accounts. Interfaces with Graph Plot for graphic data presentation.



Invoices & Statements

This program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the program produces professionally formated documents using your own printer.



Word Processor

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include, block delete, block insert, search and replace, edit text, display text, and many more.



Payroll

Managing the Payroll for up to 50 employees, this program is user friendly being menu driven, easy to use and supported by comprehensive documentation.

It shows gross pay, net pay and overtime for hourly, weekly or monthly paid employees, and holds most PAYE and NHI data together with essential SSP information.

Payrolls are automatically analysed under departmental heads and the most frequently used PAYE forms such as P14, P35 and P60 printed when required.



Stock Control

Dedicated software with all that's necessary to keep control of stock. This program will take the tedium out of stock control and save time and money. Routines include stock set up, user reference number, minimum stock level, financial summary, line print records, quick stock summary, add stock, delete/change record and more.



Easiledger

Contains routines to enable the small businessman to keep a record of one of the most important aspects of his business—cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both the Easiledger and Cashbook programs together.



Cashbook

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/ partnership business. It is designed to replace your existing cash book system and provides a computerised system complete to trial balance.

Written by practising Chartered Accountants and coded by professional programmers, the system is practical, user friendly, and replaces manual cash and bank records. From sheaves of invoices and cheque book stubs, it will take you to trial balance and produce VAT summaries, Receipts and Payments analyses, departmental sales and purchases analyses, and a full audit trail.

Combination Packs

Designed to offer maximum value and convenience to the serious business or home user by combining several programs in one pack.

Combination Business Pack No. 1

Contains: Graphplot, Spreadsheet Analysis, Payroll, Cash Book, Final Accounts

	Normal list Price of programs in pack:	Combination Pack Price	SAVING... £
.0113 BBC 32K Cassette	199.95	**159.95**	40.00
.0113 BBC 32K 40 Track Disk	207.75	**159.95**	47.80
.0113 BBC 32K 80 Track Disk	212.75	**159.95**	52.80

Combination Business Pack No. 2

Contains: Database, Stock Control, Word Processor, Mailist, Invoices & Statements.

C.0114 BBC 32K Cassette	99.75	**79.95**	19.80
.0114 BBC 32K 40 Track Disk	119.75	**79.95**	39.80
.0114 BBC 32K 80 Track Disk	124.75	**79.95**	44.80

Combination Business Pack No. 3

Contains: Database, Stock Control, Spreadsheet Analysis, Invoices & Statements, Mailist.

C.1615 ELECTRON	99.75	**79.95**	19.80

Combination Home Pack No. 1

Contains: Database, Home Accounts, Mailist, Spreadsheet Analysis, Graph Plot.

C.0116 BBC 32K Cassette	99.75	**79.95**	19.80
D.0116 BBC 32K 40 Track Disk	119.75	**79.95**	39.80
E.0116 BBC 32K 80 Track Disk	124.75	**79.95**	44.80
C.1616 ELECTRON	99.75	**79.95**	19.80

Combination Home Pack No. 2

Contains: Database, Home Accounts, Graph Plot, Mailist.

C.0417 SPECTRUM 48K	79.80	**59.95**	19.85

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PAYROLL *£39.95*
} Same price for Cassette, 40 or 80 track disk or 3" disk—Please specify

Name ....

Address ....

....Signature ....

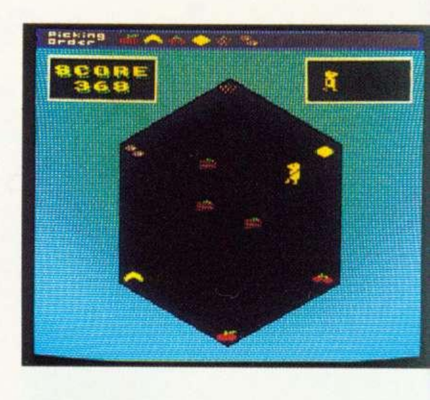
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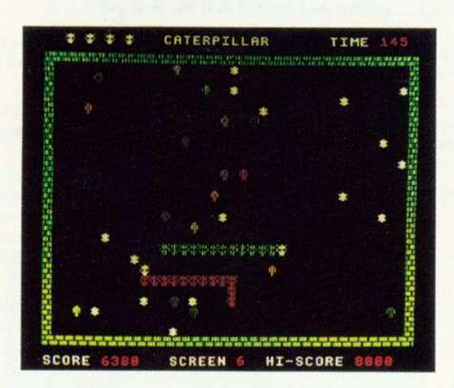
Gemini Leisure Software

Timeless classics from Gemini... fun for all the family... among the best reviewed games available!



The Sting *C.0157 BBC 32K* ***£9.95***

A new release promising to be another all-time favourite. Collect the fruit in the correct order, b avoid the deadly wasp. Sometimes a spray is available to dispense with the unwanted insect and a successful collection is rewarded with a bonus game requiring different tactics. Plenty o varied screens all with superb graphics. Excitin innovative and highly recommended.



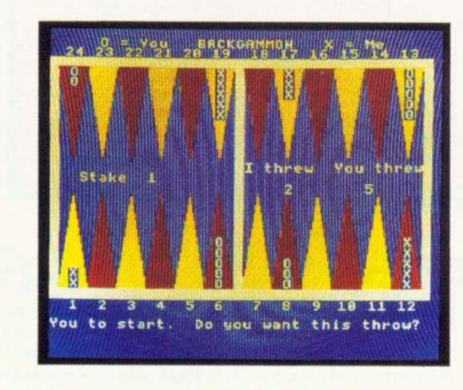
Caterpillar

C.0153 BBC 32K ***£9.95***

'Arnold' is a hungry caterpillar who has lost his way. His job is to eat all the lettuces in the garden and avoid the poisoned mushrooms. Bonuses are given if the allowed time for eating the lettuces is beaten and as the game progresses, more mushrooms and lettuces are added and the speed increases.

As you become more skilful at the game, a second caterpillar called 'Charlie' makes the game even more difficult since he must be avoided as well as the poisonous mushrooms if you are to avoid losing a life!

CATERPILLAR — "The game is well presented, playable and enjoyable" — Acorn User, Jan. 1984.



Traditional Games

C.0156 BBC 32K & Electron ***£14.95***

Consists of ACCORDION, GIN RUMMY, PIQUET and BACKGAMMON (as illustrated).

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The full and comprehensive manual, contains detailed rules for playing, plus hints on how to improve your play... until you can consistently beat the computer, at which point you should be ready to take on most players for modest stakes!



Missile Control

C.0150 BBC 32K C.1650 Electron ***£9.95***

Widely acknowledged by the trade and press as being the definitive version of this arcade classi for the BBC. Stunning graphics and as many screens as you can manage. Joystick or keyboar 4 player option, smart bombs, planes, satellites, demo mode, hi-score; it's all in this one! Also available, completely re-written for Electron.

MISSILE CONTROL — "A brilliant game with good sound and graphics" — What Micro, Nov. 1983.

"A must for arcade action freaks..." — Acorn User, Jan. 1984.

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Card No...............................Signature...............................

Name ....

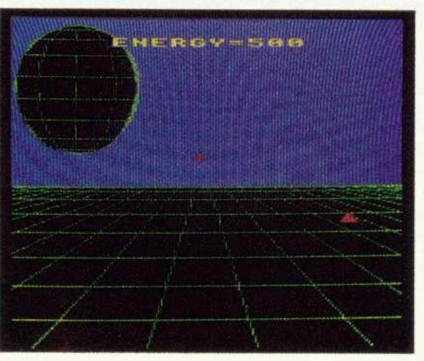
Address ....

...............................Signature...............................



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A.U.



Liberator

C.0152 BBC 32K ***£9.95***

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It is your mission to rescue these hostages, flying your new warp-ship.

On coming out of warp-drive, you materialise over a flat plain which is covered with the mutants' power pyramids. To gain sufficient energy to rescue the hostages, you need to drain power from the pyramids with your photon blasters. BEWARE! The red pyramids blast back if you let them past your ship!!

Once the plains have been traversed, you enter a mountain tunnel, which in turn is followed by a defended valley. After the valley you can pick up the hostages with your transporter beam.

After a successful rescue, you safely deliver your people home and then set out on another mission... but this time the mutants are waiting for you!!

This game can be played with either a joystick or using the BBC keyboard.

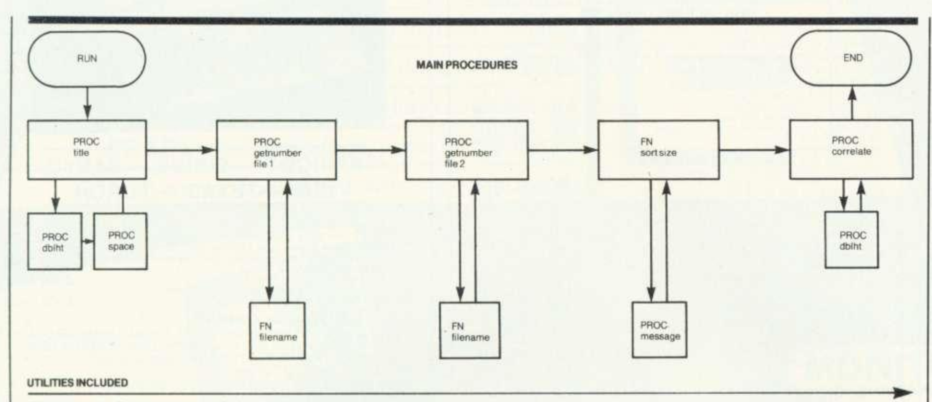


Figure 4. Structure of correlation program

'FN predict allows the user to make use of the equation produced to predict a value in one set of figures, given a matching value in the other'

page 71 ▶
can be proved (though not here!) that *m* can be found by:

$$m = \frac{\text{SigmaXY} - \dfrac{\text{SigmaX} * \text{SigmaY}}{\text{Total}}}{\text{SigmaX2} - \dfrac{(\text{SigmaX})\wedge 2}{\text{Total}}}$$

and *c* may be found from:

$$c = \frac{\text{SigmaY}}{\text{Total}} - \frac{m * \text{SigmaX}}{\text{Total}}$$

where the values SigmaX, SigmaY, SigmaX2, SigmaXY and Total are as given earlier.

In our three earlier programs we have already a series of routines and procedures which need only slight alteration before we can calculate the line of best fit. Looking at figure 6, which shows the structure of program 4, we can see that it is almost identical to that of program 3, differing only in the final procedures. There are two new routines used in program 4.

PROCregress calculates and prints the equation of the line of best fit, using the formulae given above. FNpredict allows the programmer to make use of the equation produced to predict a value in one set of figures, given a matching value in the other. Inputs are not checked in this demonstration program, so add checking routines to make the program more robust.

Line 330 may at first seem strange. It prints out the final equation, making sure only one symbol (+ or −) is shown before the *c*. Line 340 prints the absolute value of *c* to ensure it is printed without a sign. During the prediction routine, the actual calculations are cleverly performed by sending the appropriate equations to the expression evaluator, using the EVAL function (lines 860 and 910).

Amending program 4 for cassettes is similar to program 3. Change line 370 to:

```
370 VDU26,12
```

to lose the cataloguing feature. Replace lines 420, 430, 440 and 450 with:

```
420 F1$=FNfilename (1)
```

Replace lines 540, 550, 560 and 570 with:

```
540 F$=FNfilename (2)
```

Program 4 can be used simply to find the equation of the line of best fit or to predict a value in either list from a matching value in the other list. When the program has been typed into the computer and saved, it can be run. The usual questions asking for input of numberfile names are asked, then the files are loaded and compared for matching lengths. If they are not rejected at this point the program will quickly produce the appropriate equation and indicate which file is being used for the *x* values and which represents the *y* values. At this point the user can opt to end or continue the program by typing E or C then RETURN. If you wish to continue, the computer shows two versions of the equation of the line calculated and asks which version it is to use. This choice is made by deciding which value, *x* or *y*, needs to be predicted. Once this is done, the computer asks for the value from the other file (for which data exists) and quickly predicts the matching value.

Listing 5 gives a simple menu program which can be used to drive the pack from disc. Remember to set up the disc with *OPT4,3, and to *BUILD a !BOOT file in which only one line exists: CHAIN 'MENU'. When SHIFT-BREAK is pressed the disc will auto-run program 5 providing it is saved as 'MENU'. Program 5 is a dedicated menu program in which line 240 contains the program names of the four main programs in the package. These names must match the correct programs:

Program 1 ...... NAMEFE
Program 2 ...... NUMBFE
Program 3 ...... CORRFL
Program 4 ...... FITFL

Would Tony have scored higher in his second game? Readers can answer this question by entering the darts data just as I did and then running program 4. A more important question is just how valid was the actual data and application itself. The investigation we have just conducted is only one example of the application.

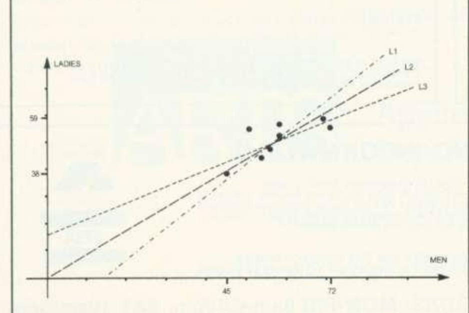


Figure 5. Scatter diagram of darts results

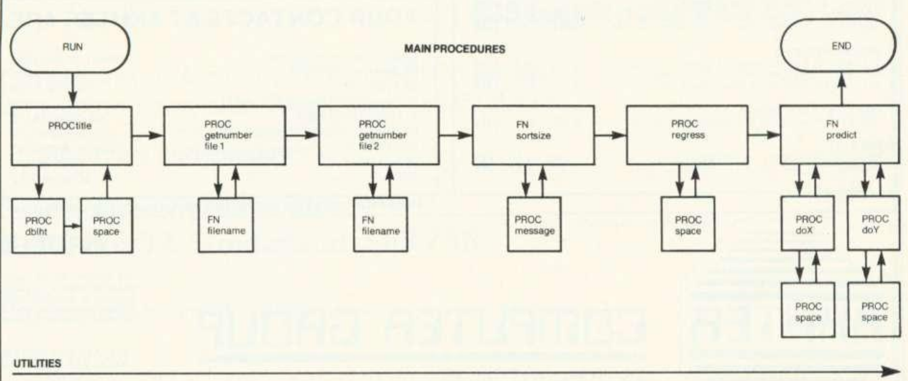


Figure 6. Structure of 'line of best fit' program

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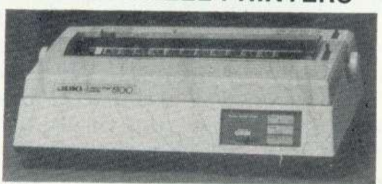
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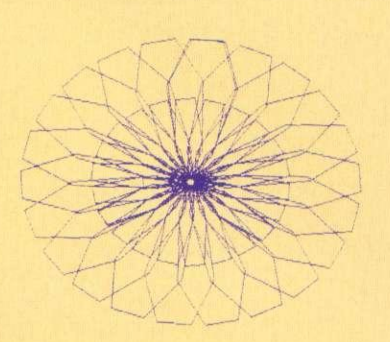
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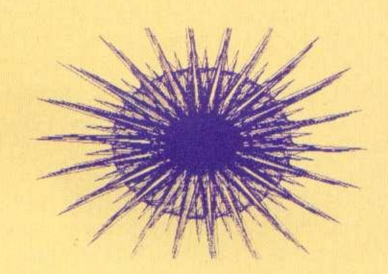
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Create a pattern and watch it grow, with Duncan Ferguson's program

HERE is a program that allows you to create your own symmetrical patterns and watch them grow. Just choose your colours, choose values for the parameters and it starts drawing. You can stop it at any point.

On level 1 you input four values and on level 2 eight values. This may sound complicated but actually all you need do is load the program *(see page 183 for the listing)*. It then asks you for values and gives you suggested ranges and some examples.

An amazing variety of patterns can be produced. They can resemble coils, flowers, balls of string, crochet table mats – virtually anything that is symmetrical about a point. Examples of my own efforts are illustrated. One of the fascinating aspects is that what appears on the screen initially as a simple shape can eventually become an intricate pattern. Your previous values are displayed so that you can make a note of them if you liked the pattern.

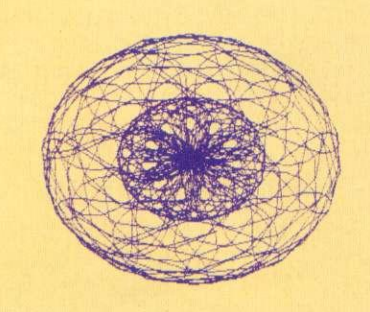
Because an 8 × 7 dot matrix printer was used in my examples, the patterns appear elongated, though on the screen they are symmetrical.

The main drawing routine (lines 1450-1540) is based on a circle radius which rotates around the screen centre point, the radius length changing at the same time.

It is the point at the end of the radius that draws the pattern. The rate of change of the angle 'A' between radius and horizontal is controlled by a sine wave function:

A=20∗T −F∗SIN(2∗π∗T∗G%) − H∗SIN (2∗π∗T∗I%)

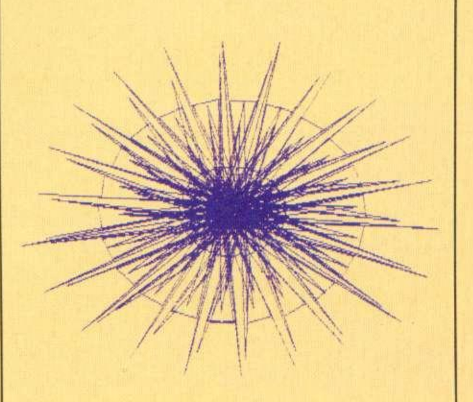
The radius moves in an oscillatory manner, the amplitude and frequency depending on the values you input. In level 1 only values for F and G% are input (lines (780-810), giving a simple sine wave oscillation of the angle. In level 2, values for F, G%, H and I% are input (lines 1090-1140), giving two superimposed oscillations of the angle.



The length of the radius is also controlled in this manner by the function:

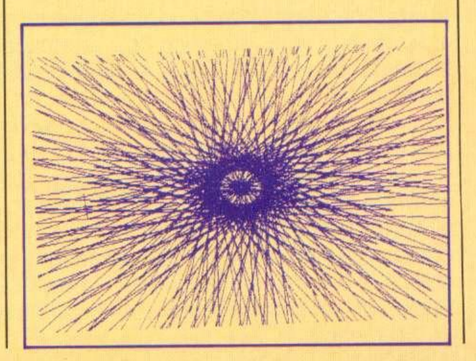
R=100−K∗SIN(2∗π∗T∗L)−M∗ SIN (2∗π∗T∗N)

In level 1 only values of K and L are input and M is zero, giving a simple sine wave oscillation. Level 2 needs values for K, L, M and N, giving two superimposed oscillations of the radius length.



The values of A and R are combined (line 1510) to produce the complex movement of the drawing point (B, C) around the screen centre.

The drawing can be stopped part way through one revolution to create a non-symmetrical shape. Stopping after one revolution produces an outline effect, whereas allowing many revolutions tends to fill in and produce a more solid pattern. Try it with 16 colours!



● **Turn to page vii in the yellow listings section for Duncan Ferguson's program.**

However, things are better with Basic, as Acorn has produced a 'Hi' version that fits right at the top of the memory map, leaving 44k of RAM free. This is possible because operating system calls are dealt with in the BBC micro, so there is no need to copy the operating system over from the main machine to the second processor.

Even 30k of RAM, though, is a terrific improvement over the 5.75k left to anyone using Mode 0, 1 or 2 in a model B with discs fitted, and Hi-Basic allows masses of room for programs. We will doubtless see much more complex software for the Beeb as a result!

Apart from the increase in speed, the BBC micro appears to function normally when using the 6502 second processor, and all legally written Basic programs should run without difficulty. Software written using PEEKS and POKES (eg, bypassing the operating system to speed up games graphics) will not work, as these activities cannot be carried across the Tube. Unfortunately, the Acorn boffins seem to have kept details of the Tube very close to their chests, so many of the languages available in ROM will not work with the second processor switched on, including Ultracalc, Wordwise and Termi. Computer Concepts' Communicator will work, however, and it will be no surprise to learn that the Acornsoft languages – View, Viewsheet and BCPL – all function normally, although there are no firm plans to produce 'Hi' versions.

Useful features have been included in the second processor's design. The most unusual is that once a language is in place in the processor it can be saved using the *SAVE command. You might want to save a language onto disc to free an extra ROM socket in your machine. For example, Hi-Basic is positioned from &B800 to &F800, so to save this onto disc (or cassette, if you don't mind the wait), you should enter:

```
*SAVE HIBASIC 0000B800 0000F800
```

The four zeros are needed before the start and end address of the block of memory to be saved to specify that 'second processor' memory is being saved – not the main machine's. Four Fs must be used to specify memory locations in the BBC micro itself for screen images, key and character definitions and so on.

Powering up the micro with the 6502 connected will automatically allocate the area above PAGE in the Beeb's memory needed for the 'soft key' character definitions. The whole character set, of course, has to be redefined. This facility would normally take up valuable memory space in the main machine, but it makes sense to use spare RAM in this way on the Beeb/6502 combination.

The system can be reset to run programs not suited for second processor operation simply by switching the processor off and pressing CTRL and BREAK to 'hard reset' the micro.

The second processor adds greatly to the power of the BBC micro, allowing longer programs to be developed and running software much faster. It will help realise the terrific graphics potential of the BBC B with software such as the Bitstik system, and we can expect other sophisticated applications programs to be developed to take advantage of the increased processing power. There is now tremendous scope for extensive adventure-style games with graphics, 3D arcade games and serious business packages. Acorn is already working on program development tools to run on the 6502, and the appearance of the unit should please Econet customers, as a second processor is needed in the network's Level 2 file-server.

The processor upgrade, costing £199, includes Tube software and the latest versions of the disc filing system (DFS), NFS (for Econet) in a 16k ROM called DNFS, and the ROM containing Hi-Basic. The user guide for the system has useful details of the differences between Basic I and Basic II (ie, Hi-Basic), with examples of how the improvements in Issue 2 affect programming.


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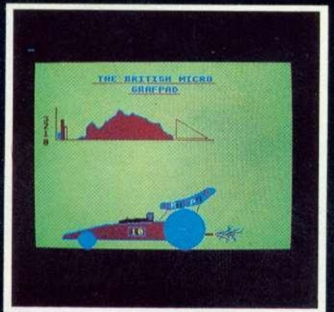
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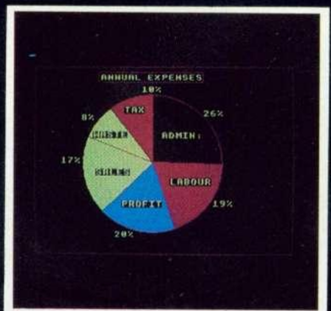
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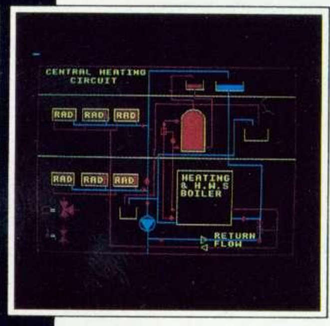
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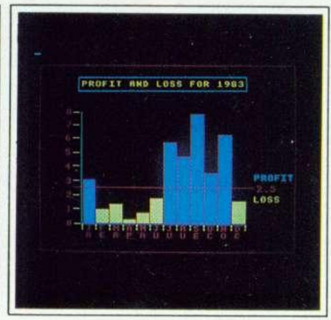
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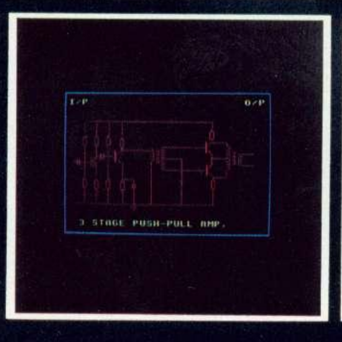
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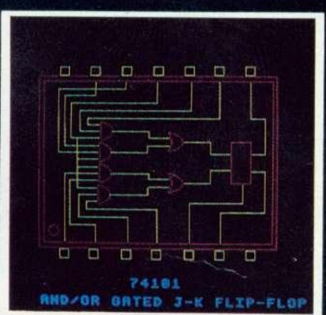












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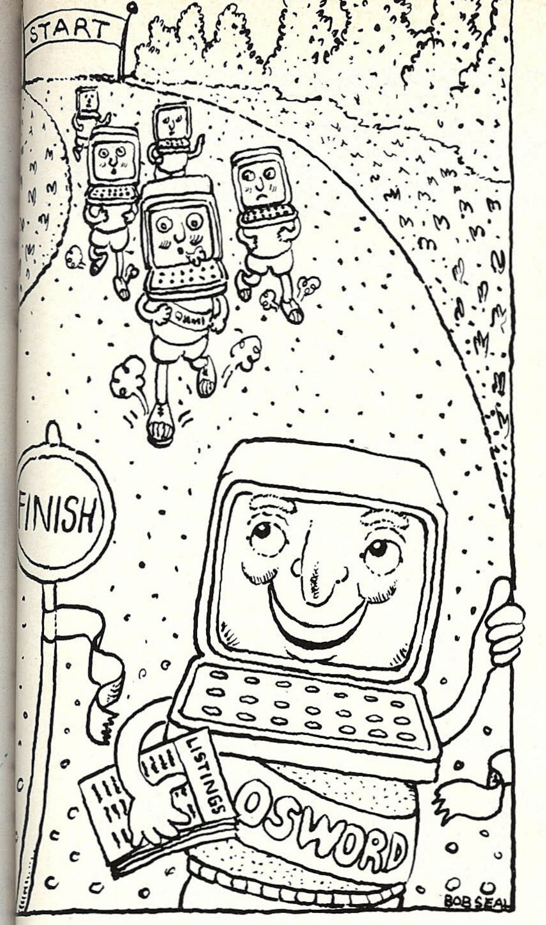
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OSWORD AT YOUR COMMAND

George Hill sets you on the right track with a beginner's guide to the DFS read/write commands

OFFICIAL information on the commands to access discs is scanty and confusing for the beginner. But an understanding of the disc filing system (DFS) and its read/write commands – particularly OSWORD – is essential. It is worth explaining, then, how the commands operate and offering example procedures for modifying data, selecting mode, disc editing and copying.

OSWORD, a machine-code routine located at address &FFF1 in the Acorn machine operating system ROM, is the general-purpose command to read or write a block of diverse information. I used it in my articles on printer dumps to extract from the memory the colour of a point in the screen memory.

The method of using OSWORD is as follows: you reserve a block of memory somewhere; it may be at a fixed address (eg, &C00 or &80 – both normally vacant) or, better, in a space reserved by a DIM statement. The parameters (items of information in the form of numbers) to be passed into the OS are deposited here. The address of the first byte of the block is passed to the OS in the X and Y registers of the 6502 processor (via X% and Y% in Basic). The accumulator is set to the number of the required OSWORD call (via A% in Basic), then, on calling OSWORD the information required is deposited in the block, and may be read on exit.

These procedures can be accomplished in either assembly language or Basic. I have chosen to program in Basic. Assembly language experts may already be familiar with the information in this article, and if not the ideas presented are readily translated into assembly language. Here is a brief resumé of the equivalents.

The sequence of events

```
10A% = &9
20X% = block MOD 256
30Y% = block DIV 256
40 CALL &FFF1
```

translates directly into

```
lda # &9
ldx # block MOD 256
ldy # block DIV 256
jsr &FFF1
```

The trouble with disc experiments is that mistakes can have disastrous results on your discs! So if you try out the commands or programs in this article use a disc containing programs that you don't mind losing or that you've duplicated on another disc. It is also important to understand the difference between a drive, a track and a sector – these are explained in figure 1 (see also Joe Telford's articles in the January 1983 issue (pp 19-23)).

Unless you write a routine to load multiple bytes in assembler, the block has to be filled one byte at a time by the sequence.

```
lda # number1
sta block
lda # number2
sta block + 1
etc.
```

OSWORD can accomplish many things. The DFS seems to intercept OSWORD calls with the accumulator set to a number in the range &7A to &7F. In these calls the parameter block is set up to transfer information to the control registers of the 8271 floppy disc controller (FDC) chip. The block takes the following form:

block + 0 This contains the drive number to be used.
block + 1 to 4 These values contain an address in the normal low-byte/high-byte form (bytes 3 and 4 will normally contain 0). This addess points to a second block of memory, which is used to pass information to, or accept information from, the 8271.
block + 5 This contains the number of bytes to expect from byte 7 on (the number of parameters).
block + 6 This contains a number that tells the disc controller chip what to do.
block + 7 on These are the parameters. Such things as track number, sector number, etc.

Now let us see how to carry out a simple disc 'read' operation to read track 0, sector 0 (see figure 1), where the disc directory stores the disc title and program names.

First, reserve a block of memory for the OSWORD parameters, and enough memory to 'buffer' one disc sector of 256 bytes:

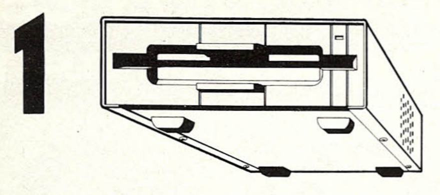
```
10DIM block 15
  :REM reserves plenty of space.
20DIM buffer 255
  :REM reserves 256 bytes.
```

Now set the 'pointers' and identify the OSWORD call:

```
30X% = block MOD 256
40Y% = block DIV 256
  :REM point to block
50A% = &7F
  :REM for DFS general purpose read/
  write.
```

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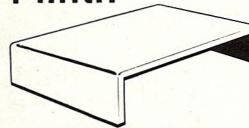
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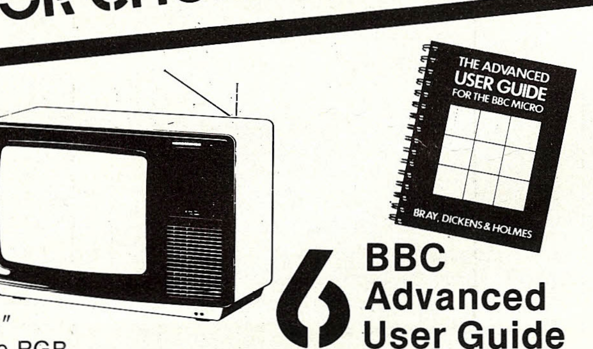
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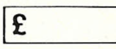
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Now set up the parameters in the block:

```
60block?0=0
      :REM drive 0.
70block!1=buffer
      :REM point to buffer.
80block?5=3
      :REM expect parameters in block +7,
      8 and 9.
90block?6=&53
      :REM 'read' the sector(s) starting at:
100block?7=0
      :REM track number;
110block?8=0
      :REM sector number.
120block?9=&21
      :REM read one sector of 256 bytes.
```

And call OSWORD.

```
130CALL &FFF1
```

The last parameter in block+9 deserves some explanation. It gives the DFS two pieces of information. The 'high nibble' (half a byte, here bits 4, 5, 6 and 7) contains the value 2. This tells the 8271 to read two of its basic units of 128 bytes of disc information for each disc sector, ie, 256-byte slices of the disc. The low nibble (bits 0, 1, 2 and 3) contains the value 1. This tells OSWORD to read one sector. Thus, to read two sectors, the parameter will be &22, and to read a complete 10-sector track it will be &2A.

One of the above statements may be by-passed. I don't use this method myself, except when memory is tight, because it doesn't help comprehensibility but the effect of

```
DIM X% 15:Y%=X% DIV 256
```

is to reserve 16 bytes at an address pointed to by X%. Only the low byte (of the four-byte integer X%) is passed to the X register on the CALL. X% DIV 256 is the high byte of the address, and is passed to the Y register, via the low byte of Y%. Thus the above sequence saves space and code, and is common in 'professional' (ie, incomprehensibly written) programs. If you use this method you have to replace 'block' in lines 60 to 120 with X%. The equivalence of these two methods is illustrated in figure 2.

Now to modify a sector. Let's change the title of the disc. Program 1 reads the directory name sector, alters the memory image of it and writes it back to the disc. The disc title is the first eight bytes of track 0, sector 0, plus the first four of track 0, sector 1. Here we mess about with only the first eight bytes, which are changed in memory by the line

```
$buffer="RUBBISH"
```

This changes bytes 0 to 6 to the ASCII codes for RUBBISH but has the side-effect of altering byte 7 to a carriage return, which has odd consequences for the screen display. The return is overwritten

```
10 REM DISC TITLE RUBBISHER
20 MODE7
30 DIM block 12
40 DIM buffer 255
50 X%=block MOD 256:Y%=block
   DIV 256
60 A%=&7F
70 block?0=0
80 block!1=buffer
90 block?5=3
100  block?6=&53
110 block?7=0
120 block?8=0
130 block?9=&21
140 CALL &FFF1
150 $buffer="RUBBISH"
160 REM remove carriage return
170 buffer?7=ASC"*"
180 block?6=&4B
190 CALL &FFF1
```

Program 1. Rewriting with OSWORD

by a '*' in the line:

```
buffer?7 = ASC"*"
```

Now the line

```
block?6 = &4B
```

converts from 'read' to 'write', and on calling OSWORD the track is re-written. The disc title on a *CAT command will show RUBBISH* as its first eight letters.

This lays the foundation for a simple disc editor, program 2, and a useful disc-copier, program 3.

In program 2 you can first choose which mode to use. I devised this because I found mode 3 (and 0) unbearable on a bad monitor. The mode 7 version has the disadvantage, however, of not displaying all the sector information on the screen at once. PROCsetup reserves the necessary space for block and buffer.

Now PROCsector (F%) prompts for the drive, track and sector numbers and reads the relevant sector as F% is TRUE. PROCpeekmem is a modification of the workspace examiner first written by Joe Telford (September 1983, pp 37-44). It displays the bytes just read from the disc in both hex and ASCII form. There are three 'areas' of the display. The first, headed 'o/s', is the offset, in bytes, from the start of the sector. The second is a listing of the hex values of the bytes, eight at a time, separated by spaces. The third is the ASCII characters for those bytes, if there are any.

A prompt asks whether you want to alter a byte, and the response Y results in prompts for an offset, and a new value for the byte. As both these prompts are obtained via EVAL, expressions such as 800 MOD 256 or &78 are acceptable inputs, and so are normal decimal numbers.

When you have changed bytes you can display the changed sector and then write it back to the disc. This is done by PROCsector (F%) with F% = FALSE.

Program 3 is a disc copier. Now you may wonder why such a thing is needed when *BACKUP is built into the operating system. *BACKUP modifies the direc-

'Note the extensive use of functions. These are trickier than procedures, but if a single value is required, as in the Y/N function, they are neater'

tory tracks during the copying process, and uses the whole memory as a buffer but there are several disadvantages to this. The copy is not identical in every respect to the original disc (which can sometimes be a severe disadvantage). Also, I have found it impossible to carry out a double-sided copy in one operation via *BACKUP. Both *BACKUP and *COPY are essentially 'one-shot' operations, as they cause the destruction of any program that was resident before use. Users with double-sided single-drive systems will have discovered that you can't back up side 0 of one disc to side 2 of another, or vice-versa, as the necessary disc-changing pauses are not allowed. Program 3 overcomes these difficulties.

The program sets up a large buffer, the maximum size of which is determined by the available memory. In mode 7 the top of usable memory is &7C00. We need 256 bytes per disc sector and there are 10 sectors per track, which means 2560 bytes per track. The copier program and its variables take up some memory so, assuming this will occupy up to about &2000 plus, we have to get our buffer within &5C00 bytes.

Eight tracks will occupy 2560*8 (=20480) bytes. In hex this is &5000, which fits nicely into the &5C00 available, and is about as many tracks as can be read at a time by this type of program. A 40-track disc is copied in five operations and an 80-track in 10.

The copier works as follows:

1. Set up the necessary buffers and blocks, and set A%, X%, Y% to the values as explained above.
2. Set the block to read one track at a time, always starting at sector 0 (block?8 = 0) and reading 10 sectors of 256 bytes (block?9 = &2A).
3. The algorithms for setting the drives to copy from and to allow all combinations. The most useful are the double-sided copy for those with double disc systems, and the change-discs options
4. You are given opportunities to abort at two points. Disc backing up is a potentially disastrous process, and you must be sure!
5. The number of tracks on the source disc is now read in FNnumber-of-tracks, and FOR...NEXT loops now cause the track pointer to step from 0 to either 39 or 79 in jumps of eight (LTR% is the 'last track' number).
6. The copying is carried out by PROCcopy-tracks and the associated PROCcopy-eight along the lines outlined above. PROCcopy-eight contains a calculation (line 750) to change the address pointer, so each of the eight tracks is copied into a separate part of the buffer. Printed messages let you see how far the copy has proceeded so far.
7. FNok checks block?10 and the copy is aborted if this is non-zero. The 8271 chip deposits its error codes in a register, and this is copied to block?10 after a read or write operation.

I find function FNyn(F$) very useful. This prints a prompt, and is TRUE if "Y" or "y" is pressed but FALSE if "N" or "n" is pressed. It just beeps if you press a key other than these two. The use of Boolean variables (ie, the logical values TRUE and FALSE) is one of the Beeb's most useful abilities. Note the extensive use of functions rather than procedures. These are a little more tricky to use, but if a single value is required (as in the Y/N function) they are much neater.

A couple of observations for the future. The program as presented has some apparent redundancies, such as the need to reset all the block parameters every time PROCcopy-tracks is invoked. This is intentional, as I wish in a future article to introduce the subject of formatting and add the option to format the destination disc to the program.

● **Turn to yellow pages v and vi for programs 2 and 3.**

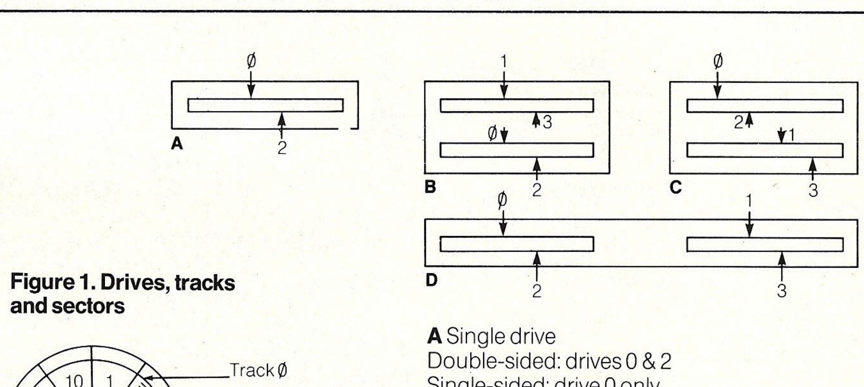


Figure 1. Drives, tracks and sectors

A Single drive
Double-sided: drives 0 & 2
Single-sided: drive 0 only
B, C and D show different configurations of double drives. If single-sided only 0 and 1 are available. Double-sided give 0, 1, 2 and 3.
Any drive may be 40 or 80 track. This may be switchable only by hardware. Forty track and 80-track discs are both in 10 sectors.

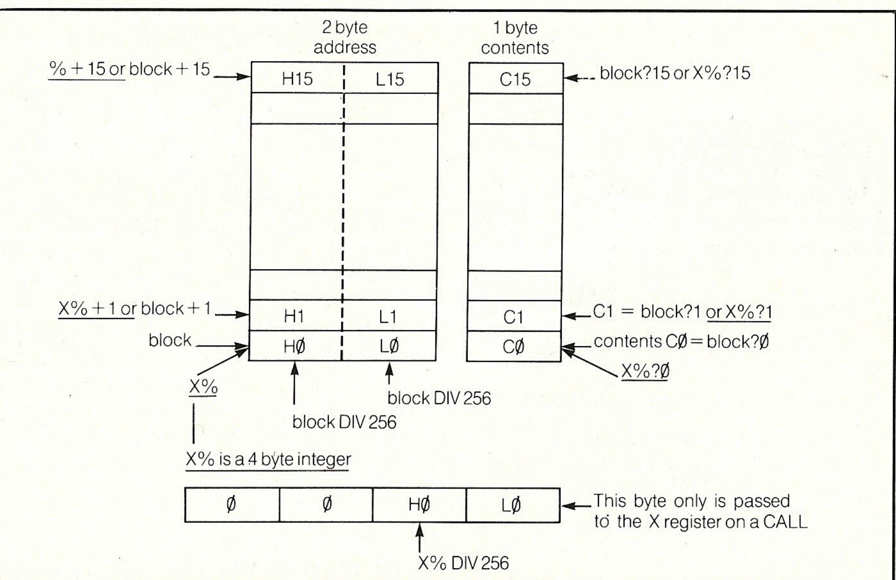
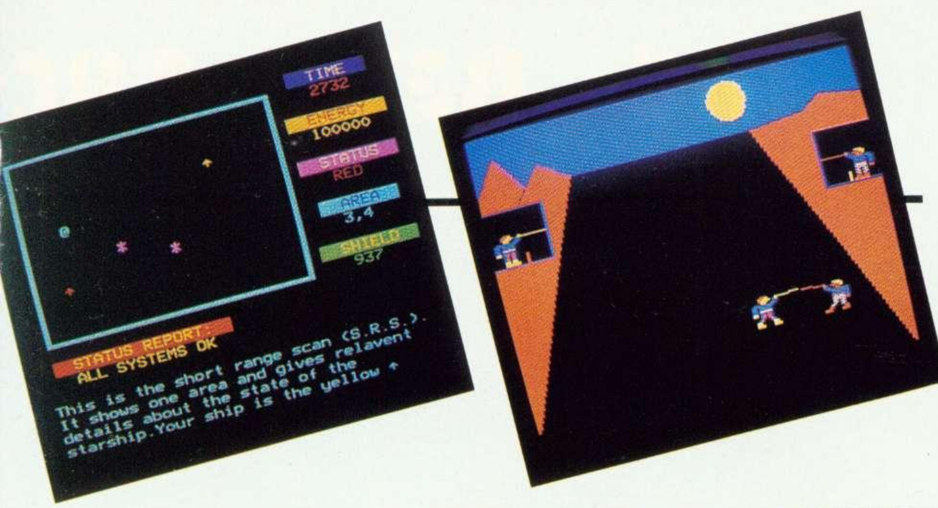


Figure 2. DIM block 15 reserves 16 bytes of memory as illustrated. The value of block is a 2-byte ADDRESS. Its hex value is obtained by typing PRINT ~ block. DIM X% 15 also reserves 16 bytes of memory. The relationship between the two methods is illustrated – X shown by underlining



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The game has been extensively developed from Tim Heaton's famous Trek III. It barely fits into 32k.

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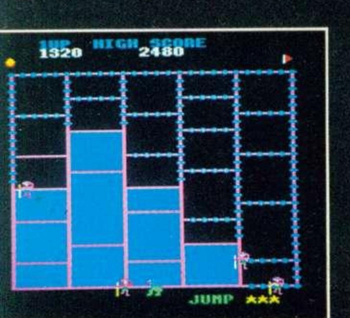
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BBC
MICRO



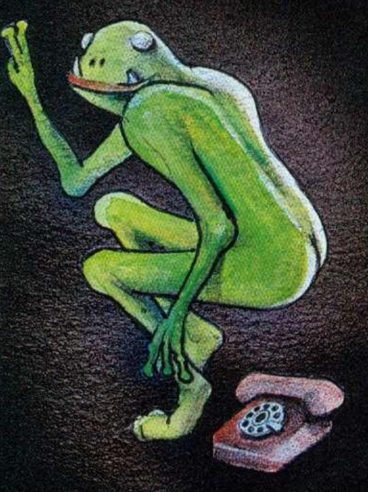














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THE FANTASTIC FOUR

That lad Simon Hancock is back again with four more simple graphics routines. What they do is a surprise, but you can bet it's going to be colourful, so start typing!

```
 10 MODE2:C%=200
 30 GCOLO,2:A%=640:B%=700:
    PROCdraw
 40 GCOLO,1:A%=300:PROCdraw
 50 GCOLO,3:A%=980:PROCdraw
 60 GCOLO,5:A%=470:B%=450:
    PROCdraw
 70 GCOLO,4:A%=810:PROCdraw
 80 X%=0
 90 REPEAT
100 X%=X%+1
110 Q%=0
120 Q%=Q%+1
130 VDU19,Q%,X%,0,0,0:X%=X%+1
135 IFX%>5 THEN X%=X%-5
136 FOR T=0 TO 200:NEXT T
140 IFQ%=5 THEN 100
150 GOTO120
160 UNTIL X>5
170 GOTO80
180 DEFPROCdraw
190 FOR D=0 TO 2*PI STEP0.02
200 MOVEA%,B%
210 PLOT69,A%+(C%*COS(D)),B%+
    (C%*SIN(D))
225 PLOT69,(A%+10)+(C%*COS(D))
    ,(B%+10)+(C%*SIN(D))
230 NEXT D
240 ENDPROC
```

```
 10 MODE2
 20 C=500:A=640:B=510
 30 FOR D=0 TO 2*PI STEP 0.02
 40 PLOT 69,A+(C*COS(D)),B+(C
    *SIN(D))
 50 NEXT D
 60 MOVE A+(C*COS(0)),B+
    (C*SIN(0))
 70 REPEAT
 80 FOR K=1TO 6
 90 FOR Z=1 TO 4
100 G=G+0.1
110 D=Z*1.1571+G
120 GCOLO,K
130 PLOT5,A+(C*COS(D)),
    B+(C*SIN(D))
140 NEXTZ
150 NEXT K
160 UNTIL G>20
170 VDU19,128,8,0,0,0
```

```
 10 MODE2
 20 MOVE400,200
 30 MOVE400,600
 40 GCOLO,3
 50 PLOT85,600,400
 60 MOVE400,600
 70 GCOLO,2
 80 PLOT85,800,600
 90 MOVE600,400
100 GCOLO,1
110 PLOT85,800,200
120 MOVE600,400
130 GCOLO,4
140 PLOT85,400,200
150 MOVE800,200
160 MOVE1050,350
170 GCOLO,1
180 PLOT85,1050,750
190 MOVE800,600
200 PLOT85,800,200
210 MOVE800,600
220 MOVE1050,750
230 GCOLO,2
240 PLOT85,650,750
250 MOVE400,600
260 PLOT85,800,600
270 K=K+1
280 FOR T=0 TO500:
    NEXTT
290 J=0
300 J=J+1
310 IF K=5 THEN K=1
320 VDU19,J,K,0,0,0:
    K=K+1
330 SOUND1,-10,100+
    K*4,1
340 IFK>4 THENK=K-4
350 IF J=4 THEN 270
360 GOTO300
```

```
 10 MODE2
 20 G=1:C=500
 30 GCOLO,1:PROCCIRC
 40 PROCCIRC2
 50 G=1.25:C=400
 60 GCOLO,6:PROCCIRC
 70 GCOLO,2:PROCCIRC2
 80 G=2.5:C=200
 90 GCOLO,5:PROCCIRC
100 GCOLO,3:PROCCIRC2
110 PROCCIRC2
120 MOVE140,510:GCOLO,4
130 PLOT5,1140,510
140 PROCCOL:END
150 DEFPROCCIRC
160 A=640:B=510
170 FORD=0 TO PI STEP0.01
180 MOVEA,B
190 PLOT69,A+((C*COS(D))*G),B+(C*SIN(D))
200 NEXT D
210 ENDPROC
220 DEFPROCCIRC2
230 FOR D=PI TO 2*PI STEP0.01
240 PLOT69,A+((C*COS(D))*G),B+(C*SIN(D))
250 NEXT D
260 ENDPROC
270 DEFPROCCOL
280 K=0
290 REPEAT
300 K=K+1:J=0
310 J=J+1
320 VDU19,J,K,0,0,0:K=K+1
330 IFK>6 THENK=K-6
340 FOR T=0 TO150:NEXT T
350 IF J=6 THEN300
360 GOTO310
370 UNTIL K>6
380 GOTO 280
390 ENDPROC
```

These four programs have been dumped to a printer and should work on the Electron and the BBC micro. Also, OS0.1 should cope with all four routines.

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BELLS AND WHISTLES

Your chance to sound off – and win yourself a crinkly blue note!

IT'S all G Beard's fault. He sent us a program imitating dripping noises, published in the Beeb Forum section of the December issue, and we invited readers to submit simple routines which produced other sound effects. Several of you took up our challenge of mimicking the Trimphone sound and the ones we publish here are from S Orme of Bramley, Yorkshire (with a publicity message), Michael Spalter of North London (with a greeting for his schoolmates) and Peter Clements of Bexley, Kent, who is quickly finding his way around his new Electron.

The other £5 winner is John Moon with *Helicopter Take-off*, which is very short but still long enough to give you a headache! We thought that a more satisfying chopper noise might be the distant thud-thudding of a helicopter flying overhead.

Can you meet the chopper challenge? We'll pay £5 for every sound effect printed. Or perhaps you'd prefer to tackle some of the other suggestions flying around our office: an owl hooting, a dog barking, a rusty gate creaking, a drum-beat, sizzling sausages, a ticking clock, a cuckoo, a man (or woman) snoring, the clip-clop of horse-hooves, castanets, waves crashing on a beach, a cock crowing, an 'Avon calling' doorbell, a whip cracking and a Tardis taking off.

Send your listing to Sound Effects, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

page 11 ▶

```
   10 REM*************************
   20 REM***** A TRIMPHONE *****
   30 REM***** BY S K ORME *****
   40 REM********* 1984 *********
   50 REM*************************
   60 MODE2
   70 ENVELOPE1,1,18,0,0,2,0,0,0,-40,0,7
0,21,95
   80 VDU23;8202;0;0;0;
   90 VDU5:GCOL0,1:MOVE0,500:PRINT"MAKE
SOMEONE HAPPY":MOVE50,350:PRINT"RING A T
RIMPHONE"
  100 FORI=1TO2:GCOL0,3:MOVE12,495-I:PRI
NT"MAKE SOMEONE HAPPY":MOVE62,344-I:PRIN
T"RING A TRIMPHONE....":NEXT:VDU4
  110 REPEAT
  120 COLOUR145:COLOUR3:PRINTTAB(5,30)"P
RESS ANY KEY"
  130 IF GET
  140 FORI=1TO6:SOUND1,1,170,8:SOUND1,0,
0,4:SOUND1,1,170,8:SOUND1,0,0,25:NEXT
  150 UNTIL FALSE
```

```
   10 REM*** Trimphone by ***
   20 REM** Peter Clements **
   30 TIME=0
   40 ENVELOPE 1,1,3,15,0,3,1,0,126,0,0,
-126,126,126
   50 SOUND 1,1,200,10
   60 REPEAT UNTIL TIME=75
   70 TIME=0
   80 SOUND 1,1,200,10
   90 REPEAT UNTIL TIME=220
  100 GOTO 30
```

YELLOW PAGES FOR LISTINGS

We've grouped the major listings in this month's issue together, to help you find your way around, or even cut them out.
Let us know what you think.

```
 10 REM HELICOPTER
 20 REM John E. Moon (1984)
 30 MODE5
 40 VDU23;8202;0;0;0;
 50 VDU19,0,4;0;
 60 P%=0:Q%=7
 70 COLOUR2:PRINTTAB(5,30)"HELICOPTER"
 80 COLOUR1:PRINTTAB(9,27)":"
 90 VDU5
100 GCOL0,2:MOVE2,122:DRAW560,130:MOVE644,130:DRAW1198,122
110 GCOL0,2:MOVE576,132:PRINT"I"
120 MOVE576,132:PRINT"I"
130 MOVE400,86:DRAW550,96:DRAW670,96:DRAW1100,50
140 MOVE340,74:DRAW450,82:DRAW800,82
150 MOVE300,20:DRAW600,0:DRAW1100,45
160 MOVE310,30:DRAW950,30
170 TIME=0:REPEAT:UNTIL TIME=100
180 FOR Z%=1 TO 5:SOUND0,-10,4,1:SOUND0,-10,10,1:NEXTZ%
190 GCOL0,0:MOVE2,122:DRAW560,130:MOVE644,130:DRAW1198,122
200 FOR G%=10 TO 2 STEP -1
210 FOR N%=1 TO 10
220 VDU19,1,P%;0;19,3,Q%;0;
230 GCOL0,1:MOVE2,130+40/G%:DRAW560,130:MOVE1100,60:PRINT"/"
240 GCOL0,3:MOVE644,130:DRAW1198,130+40/G%:MOVE1100,60:PRINT"\"
250 SOUND 0,-(17-G%),4,G%:SOUND 0,-(17-G%),5,1
260 P%=Q%:IF P%=7 THEN Q%=0 ELSE Q%=7
270 NEXTN%:NEXTG%
280 VDU4
290 FOR V=15 TO 0 STEP -.05
300 VDU19,1,P%;0;19,3,Q%;0;
310 SOUND 0,-V,4,2:SOUND 0,-V,5,1
320 P%=Q%:IF P%=7 THEN Q%=0 ELSE Q%=7
330 PRINT:NEXTV
340 PRINTTAB(1,15)"RUN for new flight"
```

```
   10 REM *TRIMPHONE*
   20 REM *Michael Spalter*
   30 REM *1984*
   40 PRINT"Hello Beeb-Buffs at Mill Hill
School"
   50 ENVELOPE 1,1,0,0,0,0,0,0,127,-1,-30,
127,126,127
   60 REPEAT
   70 FOR X=2 TO 3
   80 FOR D=2 TO 11
   90 SOUND &11,1,200,255
  100 SOUND &12,1,200,255
  110 SOUND &13,1,200,255
  120 I=INKEY(5)
  130 NEXT D
  140 I=INKEY(25)
  150 NEXT X
  160 I=INKEY(170)
  170 UNTIL FALSE
```

See 'Heaven's Date,' April issue, page 105

This program by Paul Caswell, inadvertently omitted from last month's issue, computerises the formula by which the date of Easter Sunday is fixed.

```
>
   10REM=CALENDR=050184=PGC
   20REM=Prints Gregorian calendar for any month. Gives Easter Sunday in March o
r April
   30MODE7:ON ERROR RUN
   40PRINTTAB(8,5);CHR$(141);CHR$(129);"GREGORIAN CALENDAR"
   50PRINTTAB(8,6);CHR$(141);CHR$(129);"GREGORIAN CALENDAR"''
   60PRINTCHR$(129);"Prints out the chosen month's calendar"'
   70PRINTCHR$(129);"Britain adopted the Gregorian calendar"
   80PRINTCHR$(129);"in September 1752.  Beforehand the OLD"
   90PRINTCHR$(129);"STYLE Julian dates applied in Britain."''
  100PRINTCHR$(129);"Easter Sunday is given during March or"'"April, as appropri
ate, up to 8499 A.D."''
  110INPUT"Year required  ",Y$:IF VAL(Y$)<1918 THEN message$="(New Style)" ELSE
message$=""
  120IF VAL(Y$)<1 THEN PRINT"Out of program range"':GOTO110
  130INPUT"Month required,Jan or 1 etc. ",M$:M$=LEFT$(M$,3):m=0
  140PROCstandard
  150IF M$="Invalid":PRINTM$:GOTO130
  160REM
  170PROCleap:PROCfindD:PROCfindxandD:PROCmonth:GOTO140
  180END
  190DEFPROCleap
  200REM If leapyear d=1 otherwise 0
  210year=VAL(Y$):cent=VAL(LEFT$(Y$,2)):mil=VAL(LEFT$(Y$,1))
  220d=1:IF year MOD 4<>0 THEN d=0:GOTO250
  230IF year MOD 100 =0 AND cent MOD 4<>0 THEN d=0
  240IF year MOD 4000=0 THEN d=0
  250ENDPROC
  260DEFPROCfindxandD
  270REM For month M$ d=leapyear day
  280D=D:X=31:IF M$="JANUARY"THEN400
  290D=D+X:X=28+d:IF M$="FEBRUARY"THEN400
  300D=D+X:DE=D MOD 7:X=31:IF M$="MARCH"THEN400
  310D=D+X:X=30:IF M$="APRIL"THEN400
  320D=D+X:X=31:IF M$="MAY"THEN400
  330D=D+X:X=30:IF M$="JUNE"THEN400
  340D=D+X:X=31:IF M$="JULY"THEN400
  350D=D+X:X=31:IF M$="AUGUST"THEN400
  360D=D+X:X=30:IF M$="SEPTEMBER"THEN400
  370D=D+X:X=31:IF M$="OCTOBER"THEN400
  380D=D+X:X=30:IF M$="NOVEMBER"THEN400
  390D=D+X:X=31:IF M$<>"DECEMBER"THEN 130
  400D=D MOD 7
  410ENDPROC
  420DEFPROCmonth
  430REM Month starts on day D and has X days in it.
  440CLS
  450@%=&020005
  460M$=M$+" "+Y$+" "+message$:SS=(33-LEN(M$))/2:PRINTTAB(SS,8);CHR$(131);M$
  470PRINTTAB(0,10);CHR$(129);"Sun."," Mon."," Tue."," Wed."," Thu."," Fri."," S
at."'
  480FORJ=0 TO 5:FORJ1=1 TO 7
  490D1=J*7+J1-D:IF D1<1 OR D1>X THEN D1=0
  500D1$=STR$(D1):D1$=CHR$(134)+RIGHT$("     "+D1$+" ",4):IF D1=0 THEN D1$="
 "
  510PRINT D1$,;:NEXT:PRINT:NEXT
  520IF (m=3 OR m=4) AND VAL(Y$)<8500 THEN PROCeaster ELSE ME%=0
  530IF m=ME% THEN PRINT Easter Sunday ";D%
  540PRINT:PRINT"  Press: Escape for new start"
  550PRINT"             Spacebar for next month"
```

Continued ▶

See 'Heaven's Date,' April issue, page 105.

◀ Continued

```
560PRINT"           Return for previous month":VDU7
570*FX21,0
580Q$=GET$:IFQ$=""THEN580
590M$=""
600IFQ$=CHR$(13)THEN m=m-1:IF m<1 THEN m=m+12:Y$=STR$(VAL(Y$)-1)
610IFQ$=" " OR Q$=" " THEN m=m+1:IF m>12 THEN m=m-12:Y$=STR$(VAL(Y$)+1)
620@%=&A
630ENDPROC
640DEFPROCfindD
650year=year-1
660D=365*year
670ye=year DIV 4:D=D+ye
680ye=year DIV 100:D=D-ye
690ye=year DIV 400:D=D+ye
700D=D+1
710 D=D MOD 7
720ENDPROC
730DEFPROCstandard
740IF m=1 OR M$="1" OR M$="01" OR M$="JAN" OR M$="Jan" THEN M$="JANUARY":m=1:E
NDPROC
750IF m=2 OR M$="2" OR M$="02" OR M$="FEB" OR M$="Feb" THEN M$="FEBRUARY":m=2:
ENDPROC
760IF m=3 OR M$="3" OR M$="03" OR M$="MAR" OR M$="Mar" THEN M$="MARCH":m=3:END
PROC
770IF m=4 OR M$="4" OR M$="04" OR M$="APR" OR M$="Apr" THEN M$="APRIL":m=4:END
PROC
780IF m=5 OR M$="5" OR M$="05" OR M$="MAY" OR M$="May" THEN M$="MAY":m=5:ENDPR
OC
790IF m=6 OR M$="6" OR M$="06" OR M$="JUN" OR M$="Jun" THEN M$="JUNE":m=6:ENDP
ROC
800IF m=7 OR M$="7" OR M$="07" OR M$="JUL" OR M$="Jul" THEN M$="JULY":m=7:ENDP
ROC
810IF m=8 OR M$="8" OR M$="08" OR M$="AUG" OR M$="Aug" THEN M$="AUGUST":m=8:EN
DPROC
820IF m=9 OR M$="9" OR M$="09" OR M$="SEP" OR M$="Sep" THEN M$="SEPTEMBER":m=9
:ENDPROC
830IF m=10 OR M$="10"OR M$="OCT" OR M$="Oct" THEN M$="OCTOBER":m=10:ENDPROC
840IF m=11 OR M$="11"OR M$="NOV" OR M$="Nov" THEN M$="NOVEMBER":m=11:ENDPROC
850IF m=12 OR M$="12"OR M$="DEC" OR M$="Dec" THEN M$="DECEMBER":m=12:ENDPROC
860M$="Invalid"
870ENDPROC
880REM=TO UNDERSTAND PROCeaster STUDY TABLES IN PRAYER BOOK=
885REM==
890DEFPROCeaster
900Y%=VAL(Y$):X%=(Y% DIV 100)-16
910D%=1:IF X%>25 THEN D%=D%+1:IF X%>50 THEN D%=D%+1
920C%=3:REM initial constant
930C%=C%+X%-(X%+D%) DIV 3 - X% DIV 4
935REM=Outer cycle constant now C%
940N%=(Y%+1) MOD 19:IF N%=0 THEN N%=19:REM:Golden number
950D%=(C%+(N%*19)) MOD 30
960IF N%>11 AND D%>27 THEN D%=D%-1
970IF N%<=11 AND D%=29 THEN D%=28
980REM==Paschal Moon now D% days after March 21st
990D%=D%+21:REPEAT:D%=D%+1:UNTIL (D%+DE)MOD 7=1
1000IF D%<32 THEN ME%=3 ELSE D%=D%-31: ME%=4
1010REM==EASTER SUNDAY month ME% date D%
1020ENDPROC
```

Program 2. Disc editor

```
   10 REM EDIDISC
   20 MODE7
   30 PRINT''
   40 mode=FNnum("MODE? (3 or 7)",7)
   50 *TV255,1
   60 MODEmode
   70 PROCsetup
   80 REPEAT
   90 PROCsector(TRUE)
  100 PROCpeekmem
  110 PROCalter_bytes
  120 IF FNyn("Show modified sector?") THEN PROCpeekmem
  130 IF FNyn("Write sector?") THEN PROCsector(FALSE)
  140 UNTIL NOT FNyn("Another sector?")
  150 END
  160
  170 DEFPROCsetup
  180 DIM block 12
  190 DIM buffer 255
  200 X%=block MOD 256:Y%=block DIV 256
  210 A%=&7F
  220 block!1=buffer
  230 block?5=3
  240 block?9=&21
  250 ENDPROC
  260
  270 DEFPROCpeekmem
  280 VDU12
  290 FOR I=0 TO 1-mode DIV 4
  300 PRINT" o/s   bytes (in hex)  ascii   ";
  310 NEXT
  320 PRINT
  330 linelim=32:lineposlim=7
  340 IF mode=7 THEN VDU14 ELSE VDU15
  350 start=buffer
  360 FOR line=1 TO linelim
  370 L=LEN(STR$((line-1)*8))
  380 FOR I=1 TO 4-L:VDU32:NEXT
  390 PRINT;STR$((line-1)*8);" ";
  400 FOR linepos=0 TO lineposlim
  410 content=linepos?start
  420 IF content<&10 THEN PRINT"0";
  430 PRINT;~content;" ";
  440 NEXT
  450 PRINT"  ";
  460 FOR linepos=0 TO lineposlim
  470 content=linepos?start
  480 ascii=(content>31 AND content<127)
  490 IF ascii THEN PRINTCHR$content; ELSE PRINT".";
  500 NEXT
  510 IF mode=7 THEN PRINT ELSE IF line MOD 2=0 THEN PRINT
  520 start=start+8
  530 NEXT
  540 PRINT
  550 ENDPROC
  560
  570 DEFPROCsector(F%)
  580 IF F% THEN block?6=&53 ELSE block?6=&4B:GOTO 650
  590 D%=FNnum("Drive?",3)
  600 T%=FNnum("Track?",80)
  610 S%=FNnum("Sector?",10)
  620 block?0=D%
  630 block?7=T%
  640 block?8=S%
  650 CALL&FFF1
  660 ENDPROC
  670
  680 DEFFNyn(F$)
  690  PRINTF$;" (Y/N) ";
  700 REPEAT
  710 Z=GET AND 223
  720 OK=(Z=ASC"Y" OR Z=ASC"N")
  730 IF NOT OK THEN VDU7 ELSE VDUZ,13,10
  740 UNTIL OK
  750 IF Z=ASC"Y" THEN =TRUE ELSE =FALSE
  760
  770 DEFFNnum(T$,lim)
  780 PRINTT$;" ";
  790 REPEAT
  800 INPUT""N$
  810 IF N$="" THEN val=-1 ELSE val=EVAL N$
  820 OK=(val>=0 AND val<=lim)
  830 IF NOT OK THEN VDU7,11:FOR I=1 TO LEN(T$+N$)+1:VDU9:NEXT:FOR I=1 TO LENN$:VDU127:NEXT
  840 UNTIL OK
  850 =val
  860
  870 DEFPROCalter_bytes
  880 REPEAT
  890  done=NOT FNyn("Alter byte?")
  900 IF NOT done THEN offset=FNnum("Offset from start of buffer?",255):value=FNnum("New value for byte?",255):buffer?offset=value
  910 UNTIL done
  920 ENDPROC
>
```

Program 3. Disc copier. Note that the mode 7 colour characters are shown as f0, f1, f2 etc. They are obtained, when copying, by pressing SHIFT and the appropriate red function key

```
   10 REM COPYDSK
   20 REM DISC COPIER USING OSWORD TO
   30 REM PRODUCE AN IDENTICAL COPY.
   40 REM G.B.HILL (c) January 1984
   50
   60 MODE7
   70 PROCset_up
   80 PROCsingle_or_double
   90 PROCwarning
  100 FOR DR%=0 TO side2% STEP 2
  110 IF double THEN DRF%=DR%:DRT%=DRF%+1
  120 PRINTTAB(0,3);"f6Copyingf7DRIVE ";DRF%;"f6tof7DRIVE ";DRT%
  130 LTR%=FNnumber_of_tracks-1
  140 FOR TR%=0 TO LTR% STEP 8
  150 LT%=TR%+7
  160 PROCcopy_tracks
  170 NEXT
  180 PRINTTAB(0,12);"f6First side transferred"
```

Continued ▶

V

◄ Continued

```
190 NEXT
200 IF FNanother_disc THEN RUN
210 END
220
230 DEFPROCwarning
240 CLS
250  PRINTTAB(0,3)"ƒ8ƒ7";CHR$157;"ƒ6WARNI
NGƒ0ƒ7"CHR$156;"destroys all programs on"'
260 IF double THEN PRINT"ƒ6 both sides
of disc in DRIVE 1." ELSE PRINT" ƒ6destin
ation disc in DRIVE ";DRT%
270 IF double THEN PRINTTAB(1,7)"ƒ2Plac
e source disc in DRIVE 0 and"'"ƒ2 destina
tion disc in DRIVE 1." ELSEPRINTTAB(1.7)
"ƒ2Place source disc in DRIVE ";DRF%;'"ƒ2
destinationƒ2 in DRIVE ";DRT%
280 PRINTTAB(1,15)"ƒ6Pressƒ7RETURNƒ6when
ready.";
290 REPEAT: UNTIL GET=13
300 CLS
310 ENDPROC
320
330 DEFPROCsingle_or_double
340 IF FNyn(0,2,"Double sided copy") T
HEN side2%=2:double=TRUE:cd=FALSE ELSE s
ide2%=0:double=FALSE
350 IF double THEN PRINTTAB(0,6)"ƒ1Doub
le sided copy from"'"ƒ7DRIVE 0ƒ1toƒ71ƒ1andƒ72
ƒ1toƒ73":GOTO 420
360 REM ELSE
370 DRF%=FNchoose_drives(TRUE)
380 DRT%=FNchoose_drives(FALSE)
390 cd=FNchangem
400 PRINTTAB(0,10)"ƒ1Copying fromƒ7DRIVE
 ";DRF%;"ƒ1toƒ7";DRT%
410 REM END IF
420 PRINTTAB(0,12)"ƒ6PLEASE CONFIRM (Y/
N) ";
430 IF NOT FNyn(0,12,"ƒ6PLEACE CONFIRM"
) THEN RUN
440 ENDPROC
450
460 DEFPROCset_up
470 DIM block 12
480 DIM buffer% &5000
490 X%=block MOD 256:Y%=block DIV 256
500 A%=&7F
510 ENDPROC
520
530 DEFPROCcopy_tracks
540 REM read tracks
550 IF cd THEN PROCchange("source",133
)
560 block?0=DRF%
570 block?5=3
580 block?6=&53
590 block?8=0
600 block?9=&2A
610 PROCcopy_eight("READ",131)
620 REM write tracks
630 IF cd THEN PROCchange("destination
",134)
640 block?0=DRT%
650 block?5=3
660 block?6=&4B
670 block?8=0
680 PROCcopy_eight("WRIT",130)
690 ENDPROC
700
710 DEFPROCcopy_eight(D$,C)
720 LOCAL T%
730 FOR T%=TR% TO LT%
740 PRINTTAB(0,9)CHR$C;D$;"ING TRACKƒ7"
;T%;"      "
750 block!1=buffer%+(T%-TR%)*2560
760 block?7=T%
770 CALL&FFF1
780 IF NOT FNok THEN 210
790 NEXT
800 ENDPROC
810
820 DEFFNok
830 IF block?10=0 THEN =TRUE
840 IF block?0 MOD 2=0 THEN E$="READ"
ELSE E$="WRITE"
850 PRINTTAB(0,15);"ƒ8ƒ6DISC ";E$;" ERRO
R AT TRACKƒ7";block?7
860 VDU7,7,7,7
870 =FALSE
880
890 DEFFNanother_disc
900 CLS
910 PRINTTAB(0,3)"ƒ2COPY SUCCESSFULLY C
OMPLETED."
920 =FNyn(0,5,"ƒ3Do you wish to copy an
other disc")
930
940 DEFFNyn(x,y,F$)
950 PRINTTAB(x,y);F$;" (Y/N)? ";
960 REPEAT
970 Z=GET AND 223
980 OK=(Z=ASC"Y" OR Z=ASC"N")
990 IF NOT OK THEN VDU7 ELSE VDUZ,13,1
0
1000 UNTIL OK
1010 IF Z=ASC"Y" THEN =TRUE ELSE =FALSE
1020
1030 DEFFNnumber_of_tracks
1040 A%=&7E
1050 block?0=DRF%
1060 CALL&FFF1
1070 A%=&7F
1080 sectors=(block?2 AND 3)*&100+block
?1
1090 tracks=sectors/10
1100 PRINTTAB(1,6);tracks;" TRACK DISC"
1110 =tracks
1120
1130 DEFFNchoose_drives(from)
1140 IF from THEN F$="from":tab=4 ELSE
F$="to":tab=6
1150 PRINTTAB(0,tab)"Drive to copy ";F$
;"? ";
1160 REPEAT
1170 drive=(GET-48)
1180 OK=drive>-1 AND drive<4
1190 IF OK THEN PRINT"ƒ2DRIVE ";STR$(dri
ve) ELSE VDU7
1200 UNTIL OK
1210 =drive
1220
1230 DEFFNchangem
1240 IF DRF%=DRT% THEN =TRUE
1250 IF ABS(DRF% - DRT%)<>2 THEN =FALSE
1260 =FNyn(0,8,"Do you wish to change d
iscs")
1270
1280 DEFPROCchange(SD$,C)
1290 PRINTTAB(?,13);"                  "
1300  PRINTTAB(0,13);CHR$C;"Insert ";SD
$;" disc"
1310  PRINTTAB(0,14);CHR$C;"then press"
;CHR$135;"RETURN"
1320 IF GET<>13 THEN VDU7:GOTO 1320
1330 ENDPROC
>
```

See 'Doodle Bug,' page 83

```
>
  10 VDU 4
  20 REM CREATION by D.S. Ferguson
  30 REM Acorn User May 1984
  50 :
 140 REM DRAWS IN MODE 0
 150 REM ============================
 170 X%=0
 180 MODE 1
 190 VDU5
 200 CLS
 210 VDU 19,0,2,0,0,0
 220 VDU 19,3,4,0,0,0
 230 :
 240 REM CHOOSE BACKGROUND COLOUR
 260 MOVE 100,950 : GCOL0,1
 265 PRINT "WHAT BACKGROUND COLOUR"
 270 GCOL0,3
 280 MOVE 100,700:PRINT "BLACK 0"
 290 MOVE 100,650:PRINT "RED 1"
 300 MOVE 100,600:PRINT "GREEN 2"
 310 MOVE 100,550:PRINT "YELLOW 3"
 320 MOVE 100,500:PRINT "BLUE 4"
 330 MOVE 100,450:PRINT "MAGENTA 5"
 340 MOVE 100,400:PRINT "CYAN 6"
 350 MOVE 100,350:PRINT "WHITE 7"
 360 MOVE 800,950:INPUT U%
 370 CLS
 380 :
 390 REM CHOOSE FOREGROUND COLOUR
 410 MOVE 100,950 : GCOL0,1
 415 PRINT "WHAT FOREGROUND COLOUR"
 420 GCOL0,3
 430 MOVE 100,700:PRINT "BLACK 0"
 440 MOVE 100,650:PRINT "RED 1"
 450 MOVE 100,600:PRINT "GREEN 2"
 460 MOVE 100,550:PRINT "YELLOW 3"
 470 MOVE 100,500:PRINT "BLUE 4"
 480 MOVE 100,450:PRINT "MAGENTA 5"
 490 MOVE 100,400:PRINT "CYAN 6"
 500 MOVE 100,350:PRINT "WHITE 7"
 510 MOVE 800,950:INPUT V%
 520 CLS
 530 :
 540 REM CHOOSE LEVEL
 560 MOVE 100,600
 565 PRINT "WHAT LEVEL? (1 OR 2)"
 570 *FX15,0
 580 Y%=GET
 590 IF Y%=49 THEN 640
 600 IF Y%=50 THEN 870 ELSE 570
 610 :
 620 REM LEVEL 1 INPUT VALUES
 640 CLS
 650 MOVE 100,500 : GCOL0,1
 655 PRINT "EXAMPLES"
 660 MOVE 100,450:PRINT "400,10,0,1"
 670 MOVE 100,400:PRINT "400,1,0,0"
 680 MOVE 100,350:PRINT "300,3,1,4"
 690 MOVE 100,950
 695 PRINT "INPUT VALUES BELOW"
 700 GCOL0,3
 710 MOVE 1000,950:PRINT "PREVIOUS"
 720 MOVE 1000,900:PRINT "VALUES"
 730 IF X%=0 THEN 780
 740 MOVE 1100,750:PRINT "";K
 750 MOVE 1100,700:PRINT "";L
 760 MOVE 1100,650:PRINT "";F
 770 MOVE 1100,600:PRINT "";G%
 780 MOVE 100,750
 785 INPUT "LENGTH 1 (10-500)",K
 790 MOVE 100,700
 795 INPUT "NUMBER 1 (3-1000)",L
 800 MOVE 100,650
 805 INPUT "OVERLAP 1 (0-1)",F
 810 MOVE 100,600
 815 INPUT "ROUGHNESS 1 (1-10)",G%
 820 H=0:I=1:M=0:N=1
 830 GOTO 1150
 840 :
 850 REM LEVEL 2 INPUT VALUES
 870 CLS
 880 MOVE 100,450 : GCOL0,1
 885 PRINT "EXAMPLES"
 890 MOVE 100,400
 895 PRINT "222,323,2,0,0,0,0,0"
 900 MOVE 100,350
 905 PRINT "100,20,2,1,0,1,0,54"
 910 MOVE 100,300
 915 PRINT "1000,40,0,0,21,800,0,2"
 920 MOVE 100,250
 925 PRINT "100,3,0,10,100,3,0,10"
 930 MOVE 100,200
 935 PRINT "500,50,0,1,400,70,0.2,0"
 940 MOVE 100,950:
 945 PRINT "INPUT VALUES BELOW"
 950 GCOL0,3
 960 MOVE 1000,950:PRINT "PREVIOUS"
 970 MOVE 1000,900:PRINT "VALUES"
 980 IF X%=0 THEN 1070
 990 MOVE 1100,850:PRINT "";K
1000 MOVE 1100,800:PRINT "";L
1010 MOVE 1100,750:PRINT "";F
1020 MOVE 1100,700:PRINT "";G%
1030 MOVE 1100,650:PRINT "";M
1040 MOVE 1100,600:PRINT "";N
1050 MOVE 1100,550:PRINT "";H
1060 MOVE 1100,500:PRINT "";I%
1070 MOVE 100,850:
1075 INPUT "LENGTH 1 (10-500)",K
1080 MOVE 100,800
1085 INPUT "NUMBER 1 (3-1000)",L
1090 MOVE 100,750
1095 INPUT "OVERLAP 1 (0-1)",F
1100 MOVE 100,700
1105 INPUT "ROUGHNESS 1 (1-10)",G%
1110 MOVE 100,650
1115 INPUT "LENGTH 2 (10-100)",M
1120 MOVE 100,600
1125 INPUT "NUMBER 2 (3-1000)",N
1130 MOVE 100,550
1135 INPUT "OVERLAP 2 (0-1)",H
1140 MOVE 100,500
1145 INPUT "ROUGHNESS 2 (1-10)",I%
1150 CLS
1160 :
1170 MOVE 200,600
1180 PRINT "TO STOP THE DRAWING"
1190 MOVE 200,550
1200 PRINT "PRESS S"
1210 MOVE 200,200
1220 GCOL0,1
1230 PRINT "TO CONTINUE PRESS SPACEBAR"
1240 *FX15,0
1250 IF GET=32 THEN 1290 ELSE 1240
1270 REM===========================
1290 REM START OF DRAWING ROUTINE
1310 MODE 0
1320 VDU 19,0,U%,0,0,0
1330 VDU 19,1,V%,0,0,0
1340 VDU29,640;512;
1350 :
1360 REM 'T' IS STEPLENGTH
1380 A=0:C=0:R=0:T=0.01
1390 :
1400 REM 'R' IS DISTANCE OF POINT FROM
1405 REM CENTRE. THE POINT LIES ON A
1410 REM ROTATING RADIUS
1420 R=100-K*SIN(6.284*T*L)-M*SIN(6.284*T*N)
1430 B=R
1440 MOVE B,C
1450 REPEAT
1460 :
1470 REM 'A' IS THE ANGLE BETWEEN
1475 REM HORIZONTAL AND ROTATING RADIUS
1490 A=20*T-F*SIN(6.284*T*G%)-H*SIN(6.284*T*I%)
1500 R=100-K*SIN(6.284*T*L)-M*SIN(6.284*T*N)
1510 B=R*COS(A):C=R*SIN(A)
1520 DRAW B,C
1530 T=T+0.01
1540 UNTIL INKEY(-82)
1560 REM END OF DRAWING ROUTINE
1570 REM=========================
1590 VDU 5
1600 VDU29,0;0;
1610 MOVE 100,50
1615 PRINT "FOR ANOTHER CHANCE PRESS A"
1620 *FX15,0
1630 IF GET=65 THEN X%=1:GOTO 180 ELSE 1620
1640 END
```

CIRCLES, DIAMONDS AND SQUARES

Four more listings to keep you busy and entertained. All will work on a BBC B and an Electron


```
10MODE2
20Y=0
30X=0
40FORY=0 TO 1000 STEP200
50FORX=-100 TO 1100 STEP200
60PROCTRI
70NEXT X
80NEXTY
90END
100DEFPROCTRI
110MOVEX,Y:MOVEX+50,Y+50
120GCOLRND(1000),RND(16)
130PLOT85,X+50,Y-50
140MOVEX+200,Y:MOVEX+150,Y+50
150GCOLRND(1000),RND(16)
160PLOT85,X+150,Y-50
170MOVEX+100,Y+100:MOVEX+50,Y+50
180GCOLRND(1000),RND(16)
190PLOT85,X+150,Y+50
200MOVEX+100,Y-100:MOVEX+50,Y-50
210GCOLRND(1000),RND(16)
220PLOT85,X+150,Y-50
230GCOL0,RND(7)
240PLOT85,X+50,Y+50
250MOVEX+150,Y+50
260PLOT85,X+150,Y-50
270ENDPROC
```

```
10MODE0
20VDU19,128,3,0,0,0
30VDU19,7,4,0,0,0
40A=640:B=510
50FOR G=1 TO 2.5 STEP0.15
60C=G*5000
70FOR D=0 TO 2*PI STEP 0.15
80MOVEA,B
90PLOT5,A+((C*COS(D))*G),
  B+(C*SIN(D))
100NEXT D
110NEXT G
```

```
10MODE2
20A=640:B=510:C=500:Z=1:S=1000
30PROCCIRC
35FOR E=2 TO 7
40FOR F=1 TO 7
50VDU19,F,0,0,0,0
60NEXT F
61VDU19,E,E,0,0,0
62S=S-10
63FOR T=0 TO S:NEXT
65NEXT E
66GOTO35
70ENDPROC
80DEFPROCCIRC
90FORD=0 TO 2*PI STEP
  0.052359877
100MOVEA,B
110GCOL0,Z
120PLOT 5,A+(C*COS(D)),
  B+(C*SIN(D))
130Z=Z+1
140IF Z>7 THEN Z=Z-6
150NEXT D
160ENDPROC
```

```
10MODE2
20C=500:A=640:B=510
30FOR D=0 TO 2*PI STEP 0.02
40PLOT 69,A+(C*COS(D)),B+(C*SIN(D))
50NEXT D
60MOVE A+(C*COS(0)),B+(C*SIN(0))
70REPEAT
80FOR K=1TO 6
90FOR Z=1 TO 3
100G=G+0.1
110D=Z*2.0944+G
120GCOL0,K
130PLOT5,A+(C*COS(D)),B+(C*SIN(D))
140NEXTZ
150NEXT K
160UNTIL G>6
170C=C/2.5:GOTO30
```

JOE'S JOTTINGS

See 'The Sober Statistician', pages 68-71

Listing 1. Namefile entry program

```
>
    5REM PROGRAM 1 J. TELFORD
   10MODE7
   20PROCtitle
   30No=100
   40DIMname$(No)
   50PROCnames
   60PROCsave
   70 END
   80DEF PROCtitle
   90CLS
  100PROCdblht(CHR$(131)+"Statistics Pack
 1",5)
  110 PROCdblht(CHR$(132)+"Namefile Entry
 Program",10)
  120PROCspace
  130ENDPROC
  140DEF PROCnames
  150CLS
  160PROCdblht(CHR$(131)+"Namefile Entry
Program",5)
  170PRINT''"Please enter each name after
 the prompt"
  180PRINT'"Enter END as the last name."
  190VDU28,0,24,39,15
  200Total=0:REPEAT Total=Total+1
  210name$(Total)=FNgetname(Total)
  220UNTIL name$(Total)="END"
  230Total=Total-1
  240ENDPROC
  250 DEF FNgetname(x):LOCALname$
  260PRINT'x;
  270INPUT" > "name$
  280=name$
  290DEF FNfilename:LOCALfilename$
  300VDU26,12:*.
  310VDU28,0,24,39,22
  320INPUT "Filename for Names-file is >
"filename$
  330=filename$
  340 DEF PROCsave
  350 REPEAT F$=FNfilename
  360IF OPENIN(F$)=0 flag=0 ELSE PRINT"Fi
le already exists":flag=1:PROCspace
  370UNTIL flag=0
  380channel=OPENOUT(F$)
  390PRINT#channel,Total
  400FORname=1TOTotal
  410PRINT#channel,name$(name)
  420NEXTname
  430CLOSE#0
  440VDU26,12
  450PRINT''"Done"
  460ENDPROC
  470STOP
  480 DEF PROCdblht(x$,y)
  490 PRINTTAB(19-(LENx$/2),y);CHR$(141);
x$
  500 PRINTTAB(19-(LENx$/2),y+1);CHR$(141
);x$
  510 ENDPROC
  520 DEF PROCspace
  530 PRINTTAB(3,24);"Press the SPACE BAR
 to continue";:*FX21,0
  540 REPEAT UNTIL GET$=" "
  550 ENDPROC
```

Listing 2. Numberfile entry program

```
>
   10REM PROGRAM 2 J. TELFORD
   20MODE7
   30PROCtitle
   40Total=FNgetnamefile
   50DIMname$(Total),number(Total)
   60PROCgetnames
   70PROCnumbers
   80PROCsave
   90 END
  100DEF PROCtitle
  110CLS
  120PROCdblht(CHR$(131)+"Statistics Pack
 1",5)
  130 PROCdblht(CHR$(132)+"Number Entry P
rogram",10)
  140PROCspace
  150ENDPROC
  160DEF PROCnumbers
  170VDU26,12
  180PROCdblht(CHR$(131)+"Number Entry Pr
ogram",5)
  190PRINT''"Please enter each number aft
er the"
  200PRINT'"matching name is shown."
  210VDU28,0,24,39,15
  220FOR no= 1 TO Total
  230number(no)=FNgetnumber(no)
  240NEXTno
  250ENDPROC
  260 DEF FNgetnumber(x):LOCALnumber
  270PRINT'x;" ";name$(x);
  280INPUTTAB(30)number
  290=number
  300DEF FNfilename(X$):LOCALfilename$
  310VDU26,12:*.
  320VDU28,0,24,39,22
  330PRINT"Filename for "X$"-file is";:IN
PUT" > "filename$
  340=filename$
  350 DEF PROCsave
  360 REPEAT F$=FNfilename("Number")
  370IF OPENIN(F$)=0 flag=0 ELSE PRINT"Fi
le already exists":flag=1:PROCspace
  380UNTIL flag=0
  390channel=OPENOUT(F$)
  400PRINT#channel,Total
  410FORnumber=1TOTotal
  420PRINT#channel,number(number)
  430NEXTnumber
  440CLOSE#0
  450VDU26,12
  460PRINT''"Done"
  470ENDPROC
  480DEF FNgetnamefile
  490REPEAT F$=FNfilename("Name")
  500IF OPENIN(F$)<>0 flag=1 ELSE PRINT"F
ile doesn't exist":flag=0:PROCspace
  510UNTIL flag=1
  520CLOSE#0
  530channel=OPENIN(F$)
  540INPUT#channel,Total
  550=Total
  560DEF PROCgetnames
  570LOCALnumber
  580FORnumber=1TOTotal
  590INPUT#channel,name$(number)
  600NEXTnumber
  610CLOSE#0
  620ENDPROC
  630STOP
```

Continued ▶

See 'The Sober Statistician', pages 68-71

◀ *Continued*

```
  640 DEF PROCdblht(x$,y)
  650 PRINTTAB(19-(LENx$/2),y);CHR$(141);
x$
  660 PRINTTAB(19-(LENx$/2),y+1);CHR$(141
);x$
  670 ENDPROC
  680 DEF PROCspace
  690 PRINTTAB(3,24);"Press the SPACE BAR
 to continue";:*FX21,0
  700 REPEAT UNTIL GET$=" "
  710 ENDPROC
```

Listing 3. Correlation program

```
   10REM PROGRAM 3 J. TELFORD
   20MODE7
   30PROCtitle
   40PROCgetnumberfile1
   50PROCgetnumberfile2
   60continue=FNsortsize
   70IF continue=1 PROCcorrelate
   80 END
   90DEF PROCtitle
  100CLS
  110PROCdblht(CHR$(131)+"Statistics Pack
 1",5)
  120 PROCdblht(CHR$(132)+"Correlation Pr
ogram",10)
  130PROCspace
  140ENDPROC
  150DEF PROCcorrelate
  160VDU26,12
  170PROCdblht(CHR$(131)+"Correlation Pro
gram",5)
  180PROCdblht(CHR$(129)+"Please wait....
..Correlating",10)
  190SigmaX=0:SigmaY=0:SigmaXY=0:SigmaX2=
0:SigmaY2=0
  200FORnumber=1 TO Total1
  210SigmaX=SigmaX+no1(number)
  220SigmaY=SigmaY+no2(number)
  230SigmaXY=SigmaXY+(no1(number)*no2(num
ber))
  240SigmaX2=SigmaX2+(no1(number)^2)
  250SigmaY2=SigmaY2+(no2(number)^2)
  260NEXTnumber
  270top= Total1*SigmaXY - SigmaX*SigmaY
  280base=SQR((Total1*SigmaX2 - SigmaX^2)
*(Total1*SigmaY2 - SigmaY^2))
  290IF base=0 VDU26,12:PRINT"Error - div
ision by zero":ENDPROC
  300r=INT(top*1000/base)/1000
  310VDU26,12
  320PRINT''"Correlation between "F$
  330PRINT'"and "F1$''"is ";r''"Done"
  340ENDPROC
  350DEF FNfilename(x):LOCALfilename$
  360VDU26,12:*.
  370VDU28,0,24,39,22
  380PRINT"Name for number-file ";x;" is"
;:INPUT" > "filename$
  390=filename$
  400 DEF PROCgetnumberfile1
  410 REPEAT F1$=FNfilename(1)
  420IF OPENIN(F1$)<>0 flag=1 ELSE PRINT"
File doesn't exist":flag=0:PROCspace
  430UNTIL flag=1
  440CLOSE#0
  450channel=OPENIN(F1$)
  460INPUT#channel,Total1:DIMno1(Total1)
  470FORnumber=1TOTotal1
  480INPUT#channel,no1(number)
  490NEXTnumber
  500CLOSE#0
  510ENDPROC
  520DEF PROCgetnumberfile2
  530REPEAT F$=FNfilename(2)
  540IF OPENIN(F$)<>0 flag=1 ELSE PRINT"F
ile doesn't exist":flag=0:PROCspace
  550UNTIL flag=1
  560CLOSE#0
  570channel=OPENIN(F$)
  580INPUT#channel,Total2:DIMno2(Total2)
  590FORnumber=1TOTotal2
  600INPUT#channel,no2(number)
  610NEXTnumber
  620CLOSE#0
  630ENDPROC
  640DEF FNsortsize
  650IF Total1<>Total2 VDU26,12:PROCmessa
ge:=0
  660=1
  670DEFPROCmessage
  680PRINT''"Number files not the same le
ngth"
  690PRINT'"Correlation not wise."
  700PRINT'"Done"
  710ENDPROC
  720STOP
  730 DEF PROCdblht(x$,y)
  740 PRINTTAB(19-(LENx$/2),y);CHR$(141);
x$
  750 PRINTTAB(19-(LENx$/2),y+1);CHR$(141
);x$
  760 ENDPROC
  770 DEF PROCspace
  780 PRINTTAB(3,24);"Press the SPACE BAR
 to continue";:*FX21,0
  790 REPEAT UNTIL GET$=" "
  800 ENDPROC
```

Listing 4. 'Line of best fit' program

```
>
   10REM PROGRAM 4 J. TELFORD
   20MODE7
   30PROCtitle
   40PROCgetnumberfile1
   50PROCgetnumberfile2
   60continue=FNsortsize
   70IF continue=1 PROCregress ELSE END
   80REPEAT again=FNpredict
   90UNTIL again=0
  100VDU26,12:PRINT'"Done":END
  110DEF PROCtitle
  120CLS
  130PROCdblht(CHR$(131)+"Statistics Pack
 1",5)
  140 PROCdblht(CHR$(132)+"Line of best F
it Program",10)
  150PROCspace
  160ENDPROC
  170DEF PROCregress
  180VDU26,12
```

See 'The Sober Statistician', pages 68-71

```
  190PROCdblht(CHR$(131)+"Line of best Fi
t Program",5)
  200PROCdblht(CHR$(129)+"Please wait....
..Calculating",10)
  210SigmaX=0:SigmaY=0:SigmaXY=0:SigmaX2=
0:SigmaY2=0
  220FORnumber=1 TO Total1
  230SigmaX=SigmaX+no1(number)
  240SigmaY=SigmaY+no2(number)
  250SigmaXY=SigmaXY+(no1(number)*no2(num
ber))
  260SigmaX2=SigmaX2+(no1(number)^2)
  270SigmaY2=SigmaY2+(no2(number)^2)
  280NEXTnumber
  290m=(SigmaXY-(SigmaX*SigmaY/Total1))/(
SigmaX2-SigmaX^2/Total1)
  300c=SigmaY/Total1 - m*SigmaX/Total1
  310m=INT(m*1000+.5)/1000:c=INT(c*1000+.
5)/1000
  320VDU26,12
  330PRINT'"Line of best fit based on "'
F1$" = x  and "F$" = y"''"is:- y = ";m;"x
 ";:IFc>=0 PRINT"+"; ELSE PRINT"-";
  340PRINT" ";ABS(c)
  350PROCspace:ENDPROC
  360DEF FNfilename(x):LOCALfilename$
  370VDU26,12:*.
  380VDU28,0,24,39,22
  390PRINT"Name for number-file ";x;" is"
;:INPUT" > "filename$
  400=filename$
  410 DEF PROCgetnumberfile1
  420 REPEAT F1$=FNfilename(1)
  430IF OPENIN(F1$)<>0 flag=1 ELSE PRINT"
File doesn't exist":flag=0:PROCspace
  440UNTIL flag=1
  450CLOSE#0
  460channel=OPENIN(F1$)
  470INPUT#channel,Total1:DIMno1(Total1)
  480FORnumber=1TOTotal1
  490INPUT#channel,no1(number)
  500NEXTnumber
  510CLOSE#0
  520ENDPROC
  530DEF PROCgetnumberfile2
  540REPEAT F$=FNfilename(2)
  550IF OPENIN(F$)<>0 flag=1 ELSE PRINT"F
ile doesn't exist":flag=0:PROCspace
  560UNTIL flag=1
  570CLOSE#0
  580channel=OPENIN(F$)
  590INPUT#channel,Total2:DIMno2(Total2)
  600FORnumber=1TOTotal2
  610INPUT#channel,no2(number)
  620NEXTnumber
  630CLOSE#0
  640ENDPROC
  650DEF FNsortsize
  660IF Total1<>Total2 VDU26,12:PROCmessa
ge:=0
  670=1
  680DEFPROCmessage
  690PRINT''"Number files not the same le
ngth"
  700PRINT'"Regression not wise."
  710PRINT'"Done"
  720ENDPROC
  730DEF FNpredict
  740 equation1$="m*x+c":equation2$="(y-c
)/m"
  750VDU6,28,0,24,39,8,12
  760INPUT"END or Continue? E/C "again$
  770IFagain$<>"C" AND again$<>"c" =0
  780CLS
  790PRINT"1.      y=";equation1$
  800PRINT"2.      x=";equation2$
  810 INPUT'"Which equation? "no
  820 IF no=1 PROCdox ELSE PROCdoy
  830 =1
  840DEFPROCdox
  850CLS:INPUT"Please enter x value > "x
  860PRINT''"Corresponding y value is ";I
NT(EVALequation1$ *1000+.5)/1000''
  870PROCspace
  880ENDPROC
  890DEFPROCdoy
  900CLS:INPUT"Please enter y value > "y
  910PRINT''"Corresponding x value is ";I
NT(EVALequation2$ *1000+.5)/1000''
  920PROCspace
  930ENDPROC
  940STOP
  950 DEF PROCdblht(x$,y)
  960 PRINTTAB(19-(LENx$/2),y);CHR$(141);
x$
  970 PRINTTAB(19-(LENx$/2),y+1);CHR$(141
);x$
  980 ENDPROC
  990 DEF PROCspace
 1000 PRINTTAB(3,24);"Press the SPACE BAR
 to continue";:*FX21,0
 1010 REPEAT UNTIL GET$=" "
 1020 ENDPROC
```

Listing 5. Dedicated menu

```
>
   10REM PROGRAM 5 J.TELFORD
   20MODE7
   30no= FNlist
   40IF no=5 PRINT'"Done":END
   50F$=FNget(no)
   60CHAINF$
   70END
   80DEFFNlist
   90CLS
  100PROCdblht(CHR$131+"Statistics Pack 1
 MENU",2)
  110PRINT''"  1..........Name-file entry
 Program"
  120PRINT'"  2..........Number entry Pro
gram"
  130PRINT'"  3..........Correlation Prog
ram"
  140PRINT'"  4.........Line of best Fit
 Program"
  150PRINT'"  5..........END"
  160REPEAT
  170 INPUTTAB(5,18)"Which? "no
  180UNTIL no>0 AND no<6
  190=no
  200DEF FNget(no)
  210FOR I%= 1 TO no
  220READF$
  230NEXT:=F$
  240DATA NAMEFE,NUMBFE,CORRFL,FITFL
  250 DEFPROCdblht(x$,y)
  260 PRINTTAB(20-LENx$/2,y);CHR$(141);x$
  270 PRINTTAB(20-LENx$/2,y+1);CHR$(141);
x$
  280 ENDPROC
```

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```
          BASIC
00     Error number; also temp used by assembler
01,02  Current line number
03     Pointer into current statement
04     Accumulator stack pointer
05,06  Pointer to start of current statement
07     COUNT value
08-0C  Random number seed
0D,0E  TOP
0F     Temp used by PRINT and assembler
10,11  Pointer to BASIC error handler string
12     Text space pointer
13     DO..UNTIL stack pointer
14     GOSUB..RETURN stack pointer
15     FOR..NEXT stack pointer
16-24  Accumulator stack (LSB)
23,24  Free space pointer (used by DIM)
25-33  Accumulator stack
34-42  Accumulator stack
43-51  Accumulator stack (MSB)
52-5E  Misc. temp numbers/pointers
5A,5B  X-coord. for point plot routine
5C,5D  Y-coord. for point plot routine
5E     1=set,2=invert,else clear (for point plot
        routine)
5F-60  Point plot routine workspace
61     Temp used by mode 0 plot
60-72  FP ROM workspace
73-7F  FP ROM acc stack extra area

          ASSEMBLER
64,65  Allowed addr mode group bit mask area
66     Opcode construction area
67,68  Data construction area
69,6A  Mnemonic compression area

          COS
80-BF  NOT USED
C0     Byte for OSBGET constructed here
C1     Bit count
C2,C3  Misc. temp bytes
C4     Bit timer for OSBGET
C5     Previous tape i/p level
C6-C8  NOT USED
C9-D2  OSLOAD/OSSAVE control block loaded here
CB-D6  OSSAVE header construction area
D4-DB  OSLOAD header load area
DC     Checksum byte
DD     "*FLOAD" flag: bit7 =1 if FLOADing
DE-E7  (Normal VDU use)
E8,E9  Temp pointer used by 'print string'
        at FD71
EA     MON/NOMON flag:00=MON, FF=NOMON
EB     NOT USED
EC     Temp for X, used by OSBPUT,OSBGET
ED-F9  Filename read in here from tape
FA-FD  NOT USED
```

Continued ▶

BLOCK ZERO LOCATIONS FOR THE ATOM

by Mark Plumbley

FOLLOWING last month's Atom ROM routines, I now present a list of the dedicated block zero RAM locations used by the Atom. Several locations have multipurpose functions and these are listed.

Zero page may be split into four distinctive areas. The Basic interpreter uses the lower end, accessing locations #00 to #7F, with a 15-byte accumulator stack provided from #16 to #51 inclusive. The accumulator stack pointer is found at #04.

The text pointer is located at #05 and #06. Location #03 contains Y, which is used as an index from the text pointer into the current statement. Locations #13, #14 and #15 contain the DO...UNTIL, GOSUB...RETURN and FOR...NEXT stack pointers respectively.

The graphics workspace is limited to eight bytes from #5A, while the random number seed can be found in #08 to #0C.

The FP ROM is allocated workspace between #60 to #72, with extra space for the FP ROM accumulator stack available from #73 to #7F.

The assembler has its workspace limited to location #64 to #6A, these bytes being used for the compression of the mnemonics into opcode form and construction of the opcode data.

The cassette operating system is provided workspace from #B0 to #F9. The filename can be found in locations #ED to #F9, while OSLOAD or OSSAVE control block details are passed into locations #C9 to #D1.

Those lucky enough to own a DOS will know that much of the free user RAM is eaten up to provide space to store the file load and execution addresses with their length and filename pointer (#9A to #A2).

Locations #DE to #FF are used to hold information regarding the screen. Cursor details can be extracted from the first four bytes.

Page 1, in addition to being used by the hardware stack, is the general line input area. The lower end of page 2 contains the OS vectored addresses, followed by the FOR...NEXT, DO...UNTIL and GOSUB...RETURN stacks.

Page 3 contains addresses pointing to arrays, four-byte values of the integer variables and the addresses of any labels used within a program. The final third of the page contains information for use by the plot routines.

◀ Continued

```
        ATOM PAGE 1-3 USE
100-13F Immediate mode line input area
140-17F INPUT line input area; string construction area
180-1FF 6502 stack area

200,201 NMIVEC
202,203 BRKVEC
204,205 IRQVEC
206,207 COMVEC
208,209 WRCVEC
20A,20B RDCVEC
20C,20D LODVEC
20E,20F SAVVEC
210,211 RDRVEC
212,213 STRVEC
214,215 BGTVEC
216,217 BPTVEC
218,219 FNDVEC
21A,21B SHTVEC

21C-23F NOT USED

        FOR..NEXT stack (pointer at 15)
240-24A 'FOR' variable number
24B-255 'STEP' value (LSB)
256-260 'STEP' value
261-26B 'STEP' value
26C-276 'STEP' value (MSB)
277-281 'TO' value (LSB)
282-28C 'TO' value
28D-297 'TO' value
298-2A2 'TO' value (MSB)
2A3-2AD Pointer to statement after 'FOR' (LSB)
2AE-2B8 Pointer to statement after 'FOR' (MSB)

        DO..UNTIL stack (pointer at 13)
2B9-2C3 Pointer to statement after 'DO' (LSB)
2C4-2CE Pointer to statement after 'DO' (MSB)

        GOSUB..RETURN stack (pointer at 14)
2CF-2DC Pointer to statement after 'GOSUB' (LSB)
2DD-2EA Pointer to statement after 'GOSUB' (MSB)

2EB-305 Array pointers (LSB) (@@=2EB,AA=2EC..)
306-320 Array pointers (MSB) (@@=306,AA=307..)
321-33B Variable value (LSB) (@=321,A=322..)
33C-356 Variable value       (A=33D,B=33E..)
357-371 Variable value       (A=358,B=359..)
372-38C Variable value (MSB) (A=373,B=374..)
38D-3C0 Label pointers (a=38D,38E; b=38F,390..)

3C1,3C2 Last X position for plot routine
3C3,3C4 Last Y position for plot routine
3C6-3C9 Temp area used by FPUT only
3CA-3FC NOT USED
3FD     Temp used by COLOUR
3FE,3FF Pointer to point plot routine
```

```
          DOS DIRECTORY FORMAT
2000-2007 First 8 chars of TITLE
2100-2104 Last 5 chars of TITLE
2105      (No. of files in directory)*8
2106      Bits 0-3: No of sectors on disc (MSB)
2107      No of sectors on disc (LSB)

  (Add 8 to the following addresses for each extra file)
2008-200E Filename (7 chars padded with spaces)
200F      Bits 0-6: Qualifier
          Bit    7: 1 if locked
2108,2109 Load address
210A,210B Execution address
210C,210D File length (LSB)
210E      Bits 0-3: File start sector (MSB)
          Bits 4-7: File length (MSB)
210F      File start sector (LSB)

          SEQUENTIAL FILE FORMAT
  (Add #20 to these addresses for each extra file)
2200-220F Copy of directory entry for file
2210-2212 PTR for file (OSRDAR with A=0)
2213      Page used by file buffer
2214-2216 EXT of file (OSRDAR with A=1)
2217      Bits 0-3: Drive/surface no. of file
          Bit    7: 1 if o/p file; 0 if i/p file
2218-221A Space available for file on disc (OSRDAR with A=2)
221B      File mask bit
221C-221E Sector currently in buffer (OSRDAR with A=3)
221F      Flag byte

2300-27FF File buffers area (5)
```

```
        DOS
80-99   NOT USED
9A-A3   Control block area
9A,9B   Pointer to filename
9C,9D   Load addr
9E,9F   Execution addr
A0,A1   File length
A2      Bits 0-3: Start sector (MSB)
        Bits 4-7: File length (MSB)
A3      Start sector (LSB)
A4      NOT USED
A5-AB   Filename area
AC      Current qualifier
AD      FDC command byte for file block
AE-B4   NOT USED
B5-B8   Used by *CAT
B9      Handle for *EXEC file
BA      Handle for *SPOOL file
BB,BC   RDCVEC temp for *EXEC
BD,BE   WRCVEC temp for *SPOOL
BF      Temp for Y for *EXEC/*SPOOL
C0      Bits 3-7: Bit mask of files open for
        OSFIND
C1      File bit for this file only
C2      Handle temp for file routines
C3      Directory position temp for OSFIND
C5      Temp counter for OSFIND
C6      Temp to save X for OSFIND
C7      Drive/surface temp for '*'
C8      Current qualifier temp for '*'
C9,CA   Pointer to (start-1) of file block
CB,CC   No of sectors left after current
        file block
CD      Backup qualifier
CE-D4   Teletext VDU use
D5,D6   Jump vector for termination of FDC
        command
D7-DD   NOT USED
DE-E7   (Normal VDU use)
E2-E5   Teletext VDU use
E7      Teletext VDU use
E9      Temp for Y used by *SPOOL/*EXEC
EA,EB   Temp pointer used by 'print string'
        routine
EC      Track for FDC command
ED      Sector for FDC command
EE      Drive/surface number
EF      MON/NOMON flag
F0      No of retries of FDC command left
F1      No of sectors for FDC command
F2-FC   NMI routine to send/receive bytes
        from FDC
F6,F7   Pointer into memory
FD      NOT USED

        VDU HANDLER
DE,DF   Pointer to start of cursor line
E0      Pointer into cursor line (VDU off
        if bit 7 = "1")
E1      Cursor state: 80=on,00=off
E2,E3   Temp pointer
E4,E5   Temps to save X & Y registers
E6      Page mode off if bit 7 set, else
        no. of lines left
E7      'LOCK' mask: 00=normal, 60=locked

FE      Character not sent to printer
        ('LF' by default)
FF      Temp for A, used by IRQ/BRK handler
```

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◄ page 29

variable spacing of the dots on the x and y axis and variable angles. With a grid in position the dynamic cursor hops from dot to dot, greatly increasing accuracy. The angle in which the dynamic cursor can move in both the x and y axis can also be set. The cursor is taken over to select ANGLE and when it is placed over the default values, rotating the z control changes the angle locks. The figures change and a short line shows their orientation.

A disappointing feature of the Beeb version of the Bitstik compared to Apple's is the TRACE facility. When this is selected on the Apple system input can either be free-hand drawing from the Bitstik controller or from a graphics tablet, an essential tool for any serious user of a CAD system. The BBC version will allow only free-hand use of the controller; there is no easy way for pre-drawn information to be entered into the system. The manual suggests that drawings be copied onto transparent acetate which is then stuck onto the face of the monitor and traced by the use of the controller! This is difficult to do and is just not good enough for a professional system – a serious omission.

Text can be entered in any one of five sizes – quarter, half, full, twice and four times the normal size – directly onto the drawing page. By putting the text into the library and then copying it back onto the work page it can be placed at any size and at any orientation.

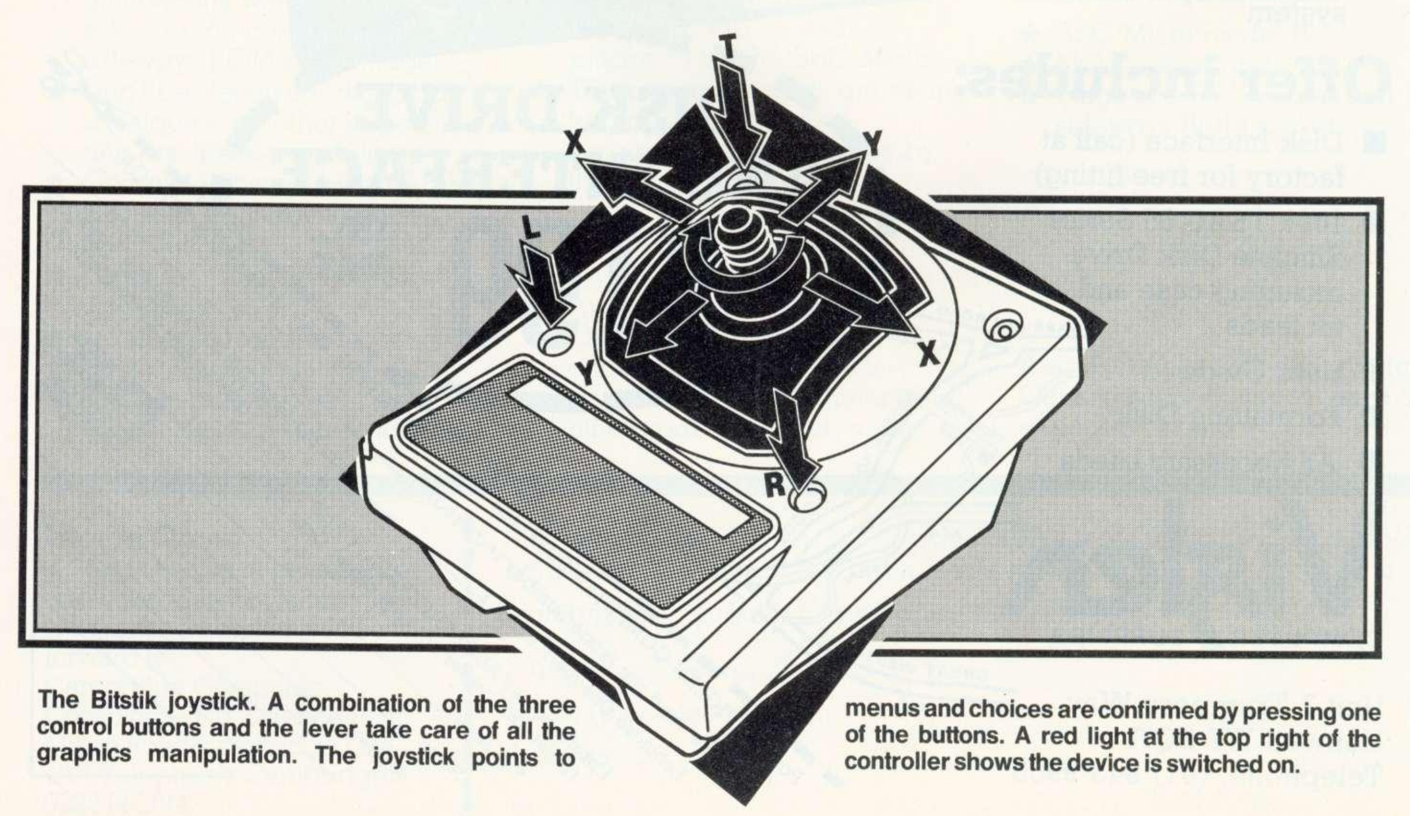
Selecting the UTILS function removes the work page and brings up a new menu. Using these functions, the image can be displayed full-size on the screen without the menus for screen photography (a most unsatisfactory way of getting pictures onto film). The image can be saved onto disc as a bit image that can be used in other software without Bitstik control and the image can be printed out. A couple of problems lurk here. First, both printed and saved image appear at the small size of the work page, without the menus, but the only printer supported by the system is Acorn's spark jet Olivetti, which hardly does justice to the quality of the images produced and is indeed useless for serious CAD applications. The Apple system comes complete with software to drive a range of popular flatbed plotters essential for this kind of work. Acorn says it is going to supply these at a later date, at extra cost. There are also two zoom stores – useful if an enlarged drawing is being worked on. Two zoom views can be stored so that if Library functions are used the user does not have to try and zoom in to exactly the same size and position; the zoom store can be called up.

Bit images generated by other software packages can be loaded onto the work page. Because they do not share the same method of data storage they cannot be subjected to most of the Bitstik functions. They can act as a background to a Bitstik drawing but the finished drawing, including the background, can be saved to disc only as a new bit image. If it is saved to the Library disc only the bits generated by the Bitstik are saved, the background disappearing. Other functions in the UTILS enable the disc drives to be changed and allow the user to return to the master system menu to change the colour palette and format new library discs.

The Bitstik user guide is split into three sections: a description of the complete system and its installation; a series of tutorials on using the systems; and a reference guide. Unfortunately, there is no index, which makes the book slightly difficult to use. Nevertheless, it's quite comprehensive. The Apple system comes with two manuals. The main one is very much like the BBC version but in addition to this there is a Quickdraw guide which quickly gets the user drawing with the system. It's a pity this hasn't been re-written for the BBC version as well.

This remarkable package offers such an amazing variety of functions that only a book could do it justice. It compares favourably with a system 20 times its price, so at about £2000 for a complete system it is remarkable value. There are only two serious niggles: the omission of a facility to use a graphics tablet and drive a proper flatbed plotter, both of which are essential for serious users of computer aided design systems.

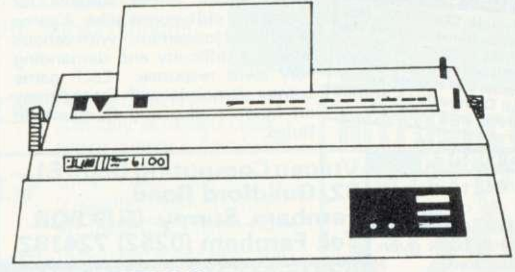
The only way to really find out about this system is to have a go with it – but be warned: once you turn it on you will want one! Owners of disc-driven BBC model Bs will need a dual 80-track drive and a second processor as well as the Bitstik package, totalling about £1000. Start saving!



The Bitstik joystick. A combination of the three control buttons and the lever take care of all the graphics manipulation. The joystick points to menus and choices are confirmed by pressing one of the buttons. A red light at the top right of the controller shows the device is switched on.

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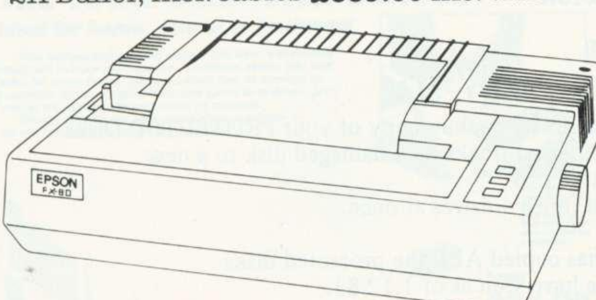
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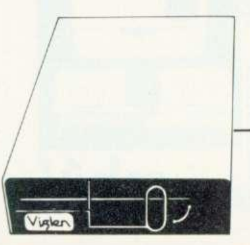
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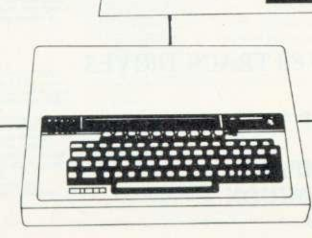
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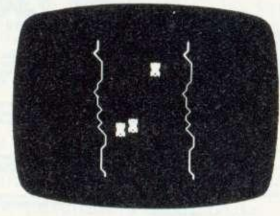
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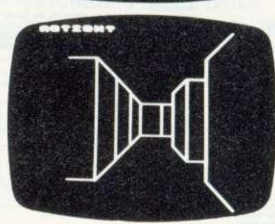
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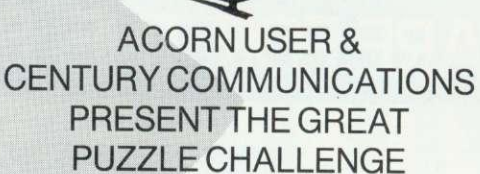
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ECONOMY DRIVE

Used disc drives are cheap and easy to set up for the Beeb, says David Graham

BEARING in mind that Acorn drives are Shugart-compatible – as are most other 5¼in floppy disc systems – I decided to invest in some reconditioned or ex-equipment drives of independent manufacture that were also compatible.

The three main manufacturers of 5¼in disc systems seem to be Control Data (CDC), Shugart and Tandon, and while these American companies tend to put most of their marketing effort into arranging large contracts with original equipment manufacturers such as IBM, a few enterprising UK suppliers are now using American drives in BBC-compatible systems. Other drives being used include Canon, Mitsubishi and TEAC from Japan. They all cost about the same: £120 plus VAT for an uncased single-sided 40-track drive, and £225 plus VAT for a double-sided 80-track. Don't be embarrassed about paying so little, because the factory gate cost is as little as £60.

It is the American drives that are the subject of this article, because they are frequently available on the surplus market and can sometimes be obtained very cheaply. However, you must know what you are buying, and you should preferably see the drive working in 40 or 80-track mode (even on a different computer), and you really should insist on a guarantee of some sort. (Beware, for example, of the Pertec 35-track drives that are being sold in Merseyside because they will not read the last few tracks of 40-track discs unless you resort to filing off bits of metal – which some intrepid BBC owners have apparently done.)

Remember, disc drives are expensive to service and if you're not able to carry out minor cleaning jobs and speed-checks yourself it is probably best to buy a BBC compatible system with a year or more's guarantee from a friendly Acorn dealer. The supplier of my drives offered a 90-day guarantee for a reconditioned and fully checked ex-Superbrain Tandon TM100/1 drive, and charged £50 plus VAT. The same company charges £70 plus VAT for unused ex-equipment drives, but there are wide variations and some quite cheeky sums being asked bearing in mind the cost of new TEACs and other makes.

There are a few wiring jobs to be done in connecting up the TM100/1, but nothing daunting or complicated. First, the 34-way lead, for which you will need a 34-way IDC female header plug, a 34-way IDC female card edge-connector and, say, 4ft of grey 34-way ribbon cable (about £7). Make sure the red band on the cable is connected to pin 1 on *both* sockets.

'You must know what you are buying and you should see the drives working in 40 or 80-track mode. And insist on a guarantee of some sort.'

Second, the power lead. This is a little more complicated, as only one supplier (Watford Electronics) advertises the plugs, costing £1.35 a pair. Plugs for the disc drive and for the BBC computer power outlet are needed, together with a 4ft length of four-way cable. Wire it up according to the diagrams and don't try to use two drives from the BBC power socket unless they are of the latest specification offering low power consumption.

Third, the disc drive PCB must be given some attention to ensure that it interfaces correctly. An eight-way DIL switch or similar device needs to be fitted in the 'programmable shunt socket'. Switches need to be set according to the number(s) of the drive (ie, 0, 1, 2, 3) and the type of controller in use (the 8271 for the BBC). The head select HS should be made at all times, and either one of NDS0, NDS1, NDS2 or NDS3 (Shugart uses DS1 to DS4 terminology) depending on which drive you want it to be: usually 0 or 2 (Shugart 1 or 3) for single-sided drives. The motor control HM and space should be left unconnected at all times, and multiplex MUX made only if you are using one drive.

You need to install a resistor terminator in another socket on the PCB. The device is in a DIL package and looks like a white, black or blue integrated circuit; it should be inserted in the *final* drive on the disc system: if you have only one drive it should be put in that one drive; if you have two it should go in the second, and so on.

The supplier of the drive should let you have the DIL switch and terminator free of charge, and because the layout of the sockets can vary you'll have to confirm their position.

Finally, you might want to tune up the performance of the BBC micro to take full advantage of the speed of the Tandon drive – 5msec track-to-track. To do this another eight-way DIL switch (£1) should be soldered into the keyboard PCB in the lower right-hand corner; there are already

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'The supplier of the drive should let you have the DIL switch and terminator free, and because the layout of the sockets can vary you'll have to confirm their position.'

holes there to accept it, but the PCB tracks are fine so be careful with the soldering! Table 1 shows the effect of making the contacts by closing the appropriate switch to the On position – the other positions alter the default screen mode (normally mode 7) and there is nothing to be done for discs with them in any case. Alternatively, you can use a *FX call (*FX255) to set the access time.

I have deliberately not mentioned the installation of the disc interface kit, because of the modification required to the computer PCB for boards of issue 3 and earlier. Ask your supplier for full instructions *before* you buy the kit.

Once you've got a disc drive you'll never regret it (I hope!). Mine cost me only about £120, including the DFS kit.

Please turn to page 111 for more annotated diagrams.

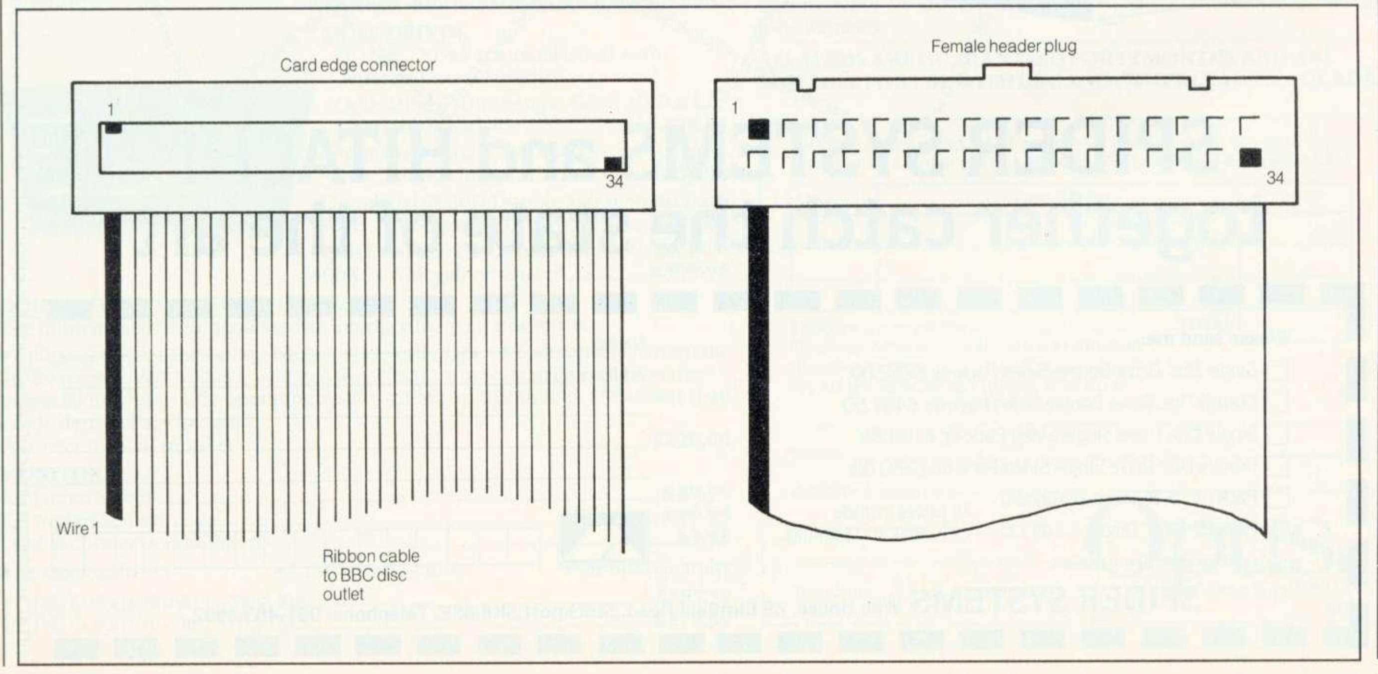
1
Front
Programmable shunt socket
Terminator socket
34
34-way connector
Power connector

Track-to-track access time (msec)	Switch positions 3	4	Typical drive type
20	open	open	Olivetti (Acorn)
6	closed	open	Tandon TM100
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Above: Top view of Control Data drive PCB

Left: Table 1 shows effect of making keyboard contacts

Below: Front view of connectors for disc cable



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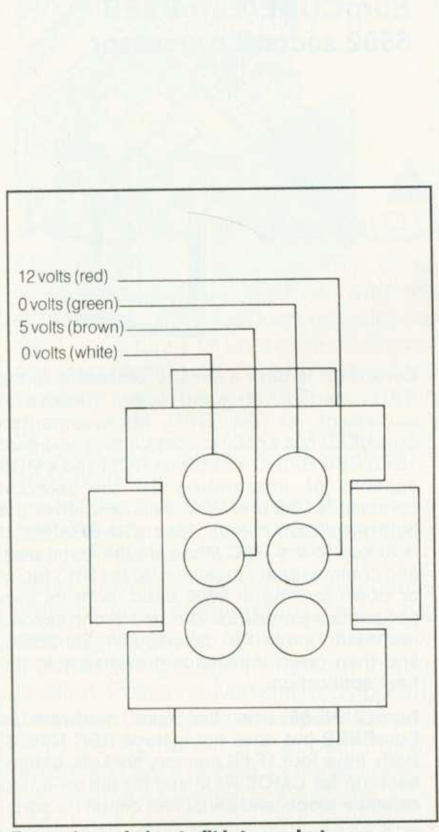
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n.b. Minimum configuration TWIN 40track or SINGLE 80track drives plus EPSON printer. Since MODE 3 screens are used, a MONITOR is recommended.

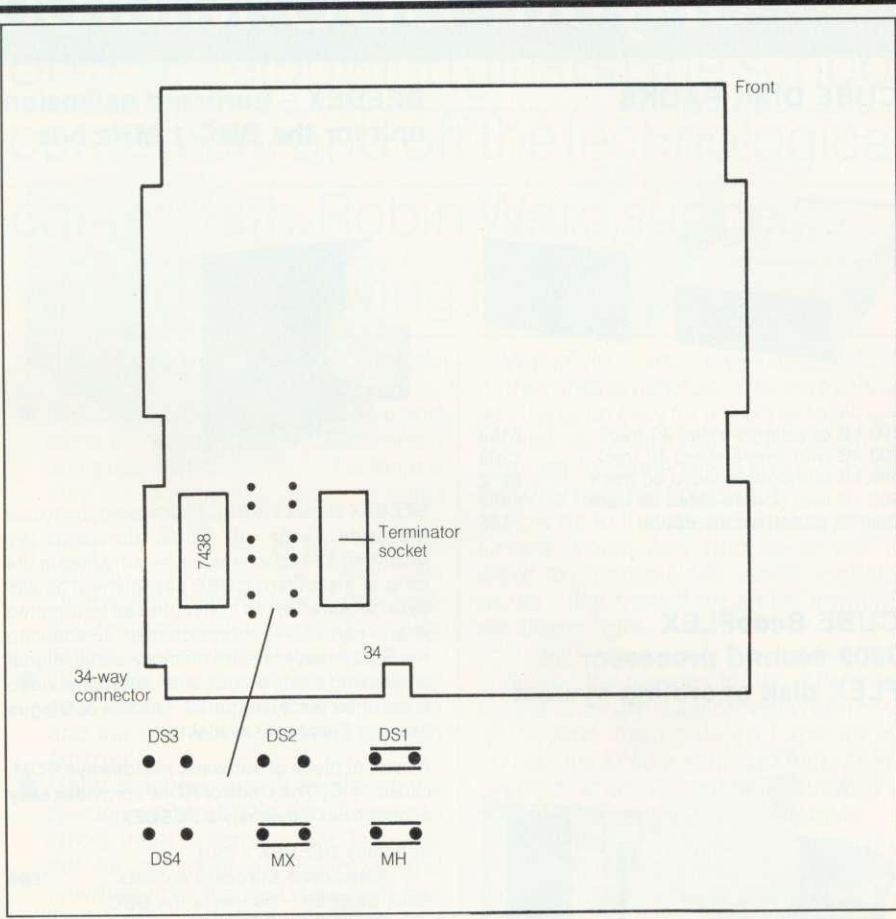
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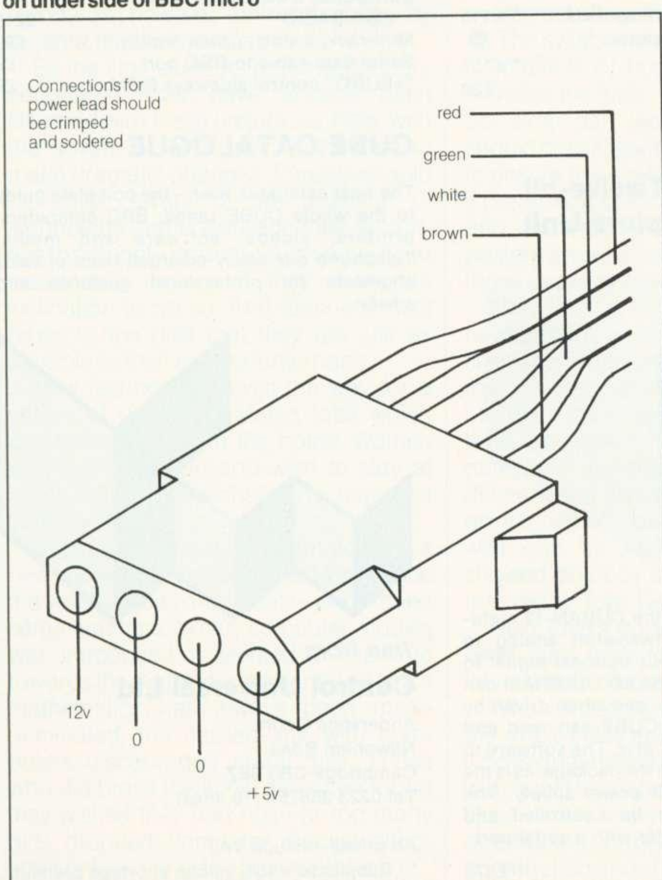
◀ page 107



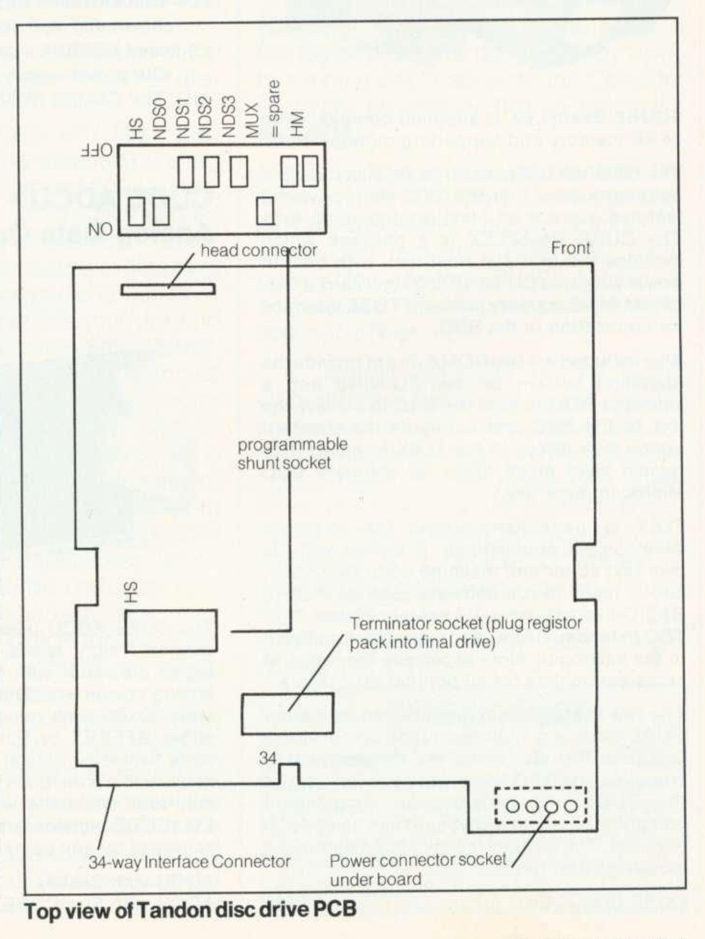
Rear view of plug to fit into socket on underside of BBC micro



Top view of Shugart disc drive PCB



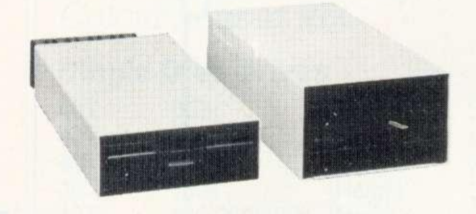
Power connector for disc drive



Top view of Tandon disc drive PCB

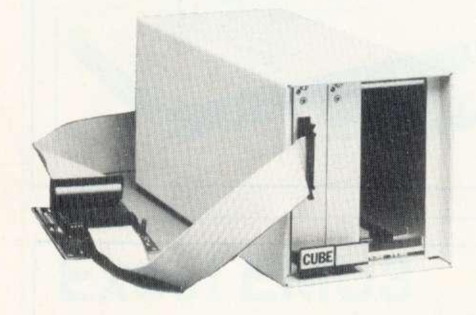
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CUBE BeebFLEX 6809 second processor FLEX disk operating system



*CUBE BeebFLEX is supplied complete with 64 kB memory and supporting monitor ROM.

The 6809 microprocessor is in many ways a better processor than the 6502. Many powerful features make it an ideal programming tool. The CUBE BeebFLEX is a package which includes the four slot mini-rack with built-in power supply, a CU-NINE 6809 cpu card, a CU-DRAM 64 kB memory card and TUBE interface for connection to the BBC.

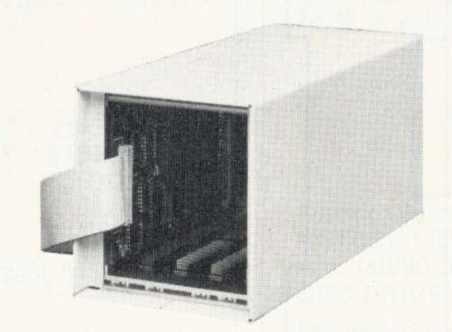
Also included are two ROMs, one to provide the operating system on the CU-NINE and a sideways ROM to fit in the BBC to achieve the link to the BBC and configure the standard floppy disk drives in the FLEX format. (They remain valid at all times for standard BBC Microcomputer use.)

FLEX is particularly useful for computer development applications. It comes with its own text editor and machine code assembler, and is ready to run software such as PL/9 (a BASIC-like assembler), Lucidata Pascal, "C", TSC Extended BASIC and many more, as listed in the catalogue. Note especially the range of cross-assemblers for all popular processors.

The two spare slots in the rack can take other CUBE cards, e.g. high-resolution colour video, industrial i/o, etc. When the development is complete, the BBC micro can be removed, and the CUBE unit becomes an independent computer, to which a keyboard can be added if required. The turnkey facility allows automatic 'power-up and run'.

CUBE BeebFLEX	**£299

BEEBEX – Eurocard extension unit for the BBC 1 MHz bus

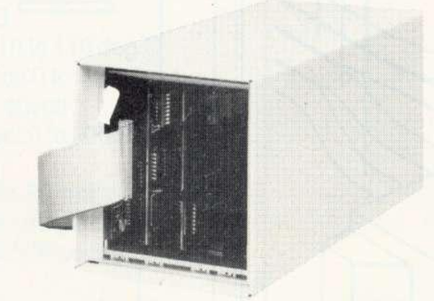


BEEBEX allows the BBC Microcomputer to use the wide range of CUBE Eurocards by providing a 64 kB extension memory map in the form of a standard CUBE backplane. The 256 byte "window" of the 1 MHz bus can be directed at any part of this extension map, so enabling the BBC to access extra memory, serial, digital and analog input/output, even additional video and printer ports if required. The free catalogue lists the Eurocards available.

A special piece of software, in sideways ROM, called "*IO, The Control ROM", provides easy access to extensions via BEEBEX.

Economy BEEBEX – four unenclosed Eurocard sockets	*£64
Rack BEEBEX – connects the BBC to a standard CUBE backplane	*£56
Low cost enclosed BEEBEX – as shown above, 3 spare sockets	**£115
Enclosed BEEBEX – as shown, with power supply	**£155
*IO, The Control ROM	£39

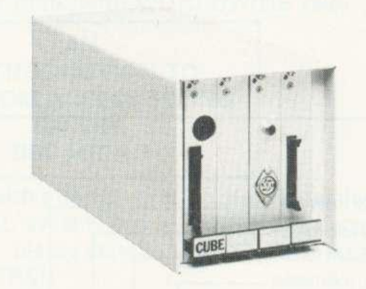
CUBE ADCU – Twelve-bit Analog Data Capture Unit



The CUBE ADCU uses the CUBAN-12 eight-channel, high speed, twelve-bit analog to digital converter with four optional digital to analog converters. The 64 kB CU-DRAM can store 30,000 such values, and when driven by either BEEBEX or EuroCUBE can read and store twelve-bit data at 7 kHz. The software to achieve this is included in the package, as is the mini-rack enclosure with power supply. The EuroCUBE version can be controlled and accessed by any computer with a serial port.

ADCU with Beebex	**£575
ADCU with EuroCUBE	**£658

EuroCUBE/EuroBEEB 6502 second processor



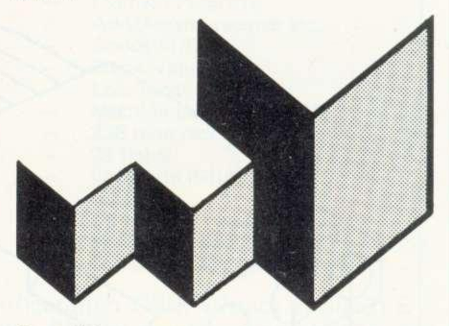
EuroBEEB is both a second processor to the BBC, and a stripped-down, industrial equivalent of the BBC Microcomputer. EuroBEEB has a 6502 processor with on-board 16 kB BBC BASIC interpreter ROM and a MOS capable of interpreting all the relevant commands, OS and VDU calls, and driving a high-resolution colour video (CU-GRAPH). It is linked to the BBC Micro via the serial port, and commands are presented to the BBC for up or down loading at 9600 baud. With its own peripherals EuroBEEB can be used in second processor mode for development purposes, and then given independent existence in the final application.

EuroCUBE-65 uses the same hardware as EuroBEEB but does not include BBC BASIC. Both have four 16 kB memory sockets, battery back-up for CMOS RAM and for the on-board calendar clock, and serial and digital i/o ports.

EuroCUBE 6502 second processor	*£139
EuroBEEB, 8 kB CMOS RAM, BBC BASIC	*£218
Mini-rack, 4 slots, power supply	£99
Serial data cable to BBC port	£8
"*EURO" control sideways ROM	£9

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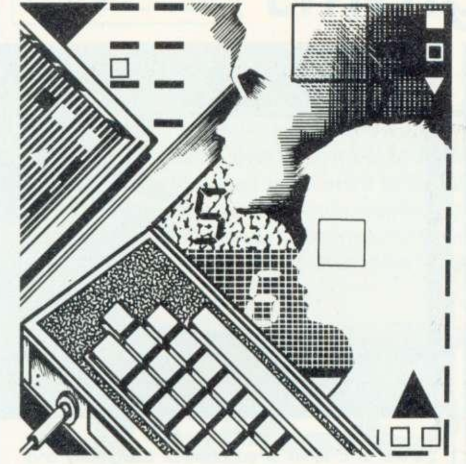


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Boys are elbowing girls off the school computer – and off the technological career path. Robin Ward suggests ways of achieving fair play

INFORMATION technology (IT) is as relevant to girls as to boys, and the introduction of new courses provides the ideal opportunity to break the traditional sex stereotyping in careers. An added incentive is that 1984 is WISE year – with government, education, industry and commerce promoting Women in Science and Engineering.

Because men and women have, in the past, been divided into stereotyped roles, this has carried on into the world of technology. Boys are guided into career patterns which enable them to lead, while girls are taught to remain in the background, giving support from an inferior position. Posters advertising jobs portray the man in the dominant, responsible post while the woman, if she appears at all, waits with pencil poised, or fingers hovering over the typewriter, or computer, keys. Girls have been prepared from birth for this role – impregnated with second class standards however unintentionally, by parents, teachers, and advisers.

By the time students reach secondary education, most have already been stamped with these prejudices. Now, with the advent of WISE year, is the time to make dramatic changes. Parents should be made aware of the potential of technology and encourage their daughters to compete in areas which have been traditionally male – if they show the inclination to do so. And teachers must prove to the girls that they are just as capable as their male counterparts.

New technology paves the way for a variety of computer-related jobs which can be carried on in the home. Women who have children and wish to stay at home will have the chance to pursue a career with hours to suit.

Because information technology is a new subject, it is the ideal time to influence the sex role ideas of students – and indeed some teachers. When computer studies was introduced, it seemed to gravitate towards the maths department, and since mathematics has always been male-dominated, the implied link with computers discouraged many girls. Those who did brave the lions' den often found they wished they had not. Far too many girls dropped computer studies altogether or failed to sit the final examination.

Research in Croydon has suggested several problems – and possible solutions.

- Girls are traditionally more passive and allow boys to push them aside when computer time is needed. This means they are sometimes unable to complete assignments.
- Boys in computer studies classes usually outnumber the girls. This means that, often for fear of making a mistake and being laughed at, girls neither ask nor answer questions.
- Computer rooms available before and after school fill up quickly with boys and the girls feel intimidated enough not to enter.
- Many teachers are unaware of the special needs of girls and appear to ignore them to some extent. The girls, not as confident as the boys and unwilling to make mistakes, fade into the background. They eventually find themselves so far behind that they lose interest altogether.
- The syllabus seems to be aimed at the interests of boys, which further alienates the girls.

So, what can teachers do? First, they should check teaching materials carefully to ensure they have general appeal, and, if possible, focus on non-traditional roles and achievements of women. Check posters and illustrations and avoid using those showing stereotyped characters.

Next, look at magazines, journals and newspapers for computer-related advertisements. Some are excellent and appeal to both sexes; one good example was for the BBC micro and showed a class of boys and girls. The text referred to a number of people, male and female, of different age groups, all of whom shared an interest in computers. The opposite was one for Asda superstores which showed one boy and his computer, and referred to 'Tom, Dick and Einstein'.

Next, take a good look at the examples used, and look for applications which interest both sexes equally.

When it comes to questions, address the whole class and notice who answers. If boys dominate the answers, be specific with questions, and involve the girls. If the class knows everyone is included in the questioning, pupils will expect a mixed contribution and should not be so wary of giving a poor answer.

Watch discussions carefully and direct further ones to avoid dominance by either sex. It is often easy for a teacher to allow a spirited and interesting discussion to carry on for some time without realizing that only boys are taking part.

Now on to that great bugbear, jargon. Choose vocabulary and be careful to avoid any unexplained use of specialist words – this, more than almost anything, will alienate girls.

Finally, beware of the hidden curriculum – the reasons for the differential uptake of certain subject by girls and boys go beyond the content of the formal curriculum. Ensure staff and parents are aware of what information technology is and why it is included in the timetable.

Allow girls to group together in the classroom for moral support, but be sure they are near the front and not on the fringe.

During extra-curricular activities, try to ensure an even spread of the sexes. If computer clubs are dominated by boys, try running single-sex sessions. Consider a simple proficiency test to determine entrance.

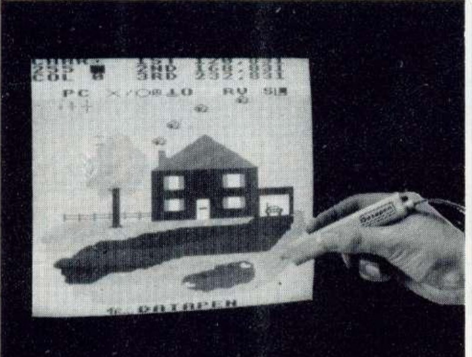
Mrs Robin Ward is assistant director of the IT project funded by the London Borough of Croydon, MEP, the Department of Trade and Industry's Girls and Technology Unit, and the EOC. Paul McGee is consultant for the Acorn User *education series of articles.*

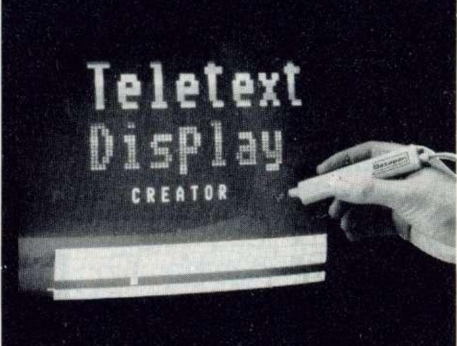
A publicity package by the Equal Opportunities Commission was sent to secondary schools earlier this year. It contains a poster on girls in IT; a computer comic, *Load Runner,* where girls share equal status; leaflets and booklets showing job opportunities for girls and the successes of a number of women in computing. The package can be ordered from Frank Smart, Publicity, EOC, Overseas House, Quay Street, Manchester, M3 3HN.

WISE SUPPORT

For more information about WISE, contact: Equal Opportunities Commission 01-379 6323 or 061-833 9244, or Engineering Council, Canberra House, 10-16 Maltravers Street, London WC2R 3ER.

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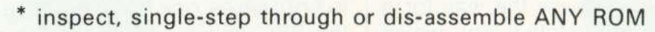


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THIS questionnaire was drawn up to discover whether the IT course in Croydon had succeeded in interesting boys and girls equally. A copy is included here for use by teachers and user group leaders. From the answers obtained, it should be relatively simple to deduce the level of participation of the sexes and perhaps figure out new strategies if the old ones have failed. It will be interesting to see if the fact that a computer has been bought for the home, and for whom it was bought, makes any difference to the answers in the first part of the questionnaire. Any points raised at home, school or user group should be addressed to the letters page.

QUESTIONS OF EQUALITY

SCHOOL ____________

____

____

Sex M☐ F☐

1 Have you found information technology classes:
- Interesting? ☐
- Useful? ☐
- Dull? ☐

2 Have you learned:
- A lot? ☐
- Some? ☐
- Very little? ☐

3 Have you used the computer yourself?
- Never ☐
- Once ☐
- Often ☐

4 Have you found the computer easy to use?
- Yes ☐
- No ☐

5 Have you answered questions in class?
- Often ☐
- Sometimes ☐
- Never ☐

6 Have you thought you knew the answer and not put up your hand?
- Often ☐
- Sometimes ☐
- Never ☐

7 Do you think IT is more interesting for:
- Boys? ☐
- Girls? ☐
- Equally interesting? ☐

8 Do you have a computer at home?
- Yes ☐
- No ☐

9 If you do have a computer, do you use it for:
- Programming? ☐
- Games? ☐
- Education? ☐
- Other uses? ☐

10 Was the computer bought specifically for you?
- Yes ☐
- No ☐

11 Does anyone else use your computer?
- Parents ☐
- Brothers ☐
- Sisters ☐
- Others ☐

12 Did you ask for the computer to be bought for you?
- Yes ☐
- No ☐



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Is yore speling reely atroshus?

Or is it just a littel bit off kei?

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SPELLWISE diligently checks every word in your text against the SPELLWISE data file. When it has finished you will be left with a list of words which are incorrectly spelt or typed, or are not in the base vocabulary of more than 6000 words (3000 in the tape version). Software is included to enable you to create your own data files. The tape version requires a recorder with motor control.

TAPE SPELLWISE £12.
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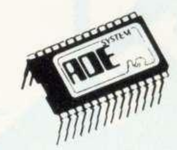
LANGUAGEWISE will print on an Epson FX80 printer and preview your text with ALL the necessary accented characters included.

```
Où est le café? le grève, la fête, à la hâte,
la gîte, le rôle, en août, le garçon, Noël,
naïve, une œuvre, Œdipe.
```

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FREEPOST SWINDON SN3 4BR

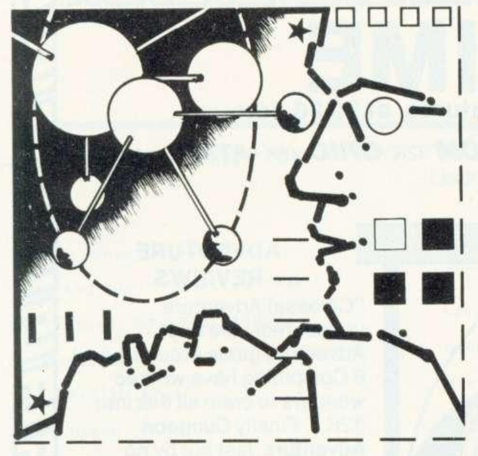


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Decimal, binary and hex conversion, Morse for radio hams, and anything loads! Atomic energy from Barry Pickles – and you

Bin, dec or hex?

CONFUSED by the relationship between decimal, binary and hex numbers? Listing 1 should help. You input a decimal number and its binary and hex equivalents are printed out. It can also be used to examine bits in memory, or the status of ports, by entering ?#xxxx in response to the prompt, where xxxx is a memory location. For those unused to binary, negative numbers are stored in what is known as 'two's complement' form. Thus, for example, −1 and +255 will show the same binary number, because −1 really needs more than eight bits to represent it. However, the hex equivalent will be different, showing eight bytes for a negative number instead of two.

The machine-code does all the work by taking the value of A (accumulator) and shifting it left, causing the least significant bit to fall into the carry bit (line 40). If the bit is set (logic 1), A is loaded with the ASCII code for number 1; if clear, the code for number 0 is loaded instead (lines 50 and 60). This is then printed by a call to #FFF4. This is done eight times, once for each bit.

Listing 1. Decimal entries printed in binary and hex

```
 10REM: binary printer
 20P=#21C;Q=#FFF4;P.$21;[
 30 CLC;LDX@8;STA#80
 40 ASL#80;BCC P+4;BCS P+10
 50 LDA@#30;JSR Q;JMP P+8
 60 LDA@#31;JSR Q
 70 DEX;BNE P-20;RTS;]
 80P.$6$12;;DO
 90aIN."DECIMAL NUMBER"A
100IF ABS(A)>255 GOS.b;G.a
110P."BINARY ";LI.#21C;P.'
120P."HEX     "&A'';U.0
130bP."OUT OF RANGE!"';R.
```

Trial by tape

THE Atom cassette operating system is not totally reliable and, although my own equipment allows me to load most tapes, I occasionally have problems. Listings 2 and 3 can provide a solution. Listing 2 says to the OS, 'Get whatever you can from the cassette port, even if it's garbage, and store it from #8200 onwards.' LINK#FC4F (line 70) displays the PLAY TAPE message and waits for a keypress. The CLEAR2 instruction allows you to see that something is coming in. Occasionally, you will see gaps in the screen display – this is the high tone between blocks.

Listing 3 allows you to see what has been taken in, in the hope that you can repair the damage. The format is eight bytes to a line. If a byte is within ASCII range it is displayed as such, otherwise it displays hex. When repaired, the program can be relocated, block by block, and re-saved. Remember that listing 2 takes anything from tape, including the block headers.

Listing 2. Anything goes!

```
 5REM: bad file copier
10 !#90=#8200;Y=0
20 P=#21C;Q=P;P.$21;[
30 JSR#FBEE;STA(#90),Y
40 INY;CPY@0;BEQ P+5
50 JMP Q;INC#91
60 JMP Q;];P.$6
70 LI.#FC4F;CLEAR 2
80 LI.Q
```

Listing 3. Surveying the damage

```
  5REM: bad file reader
 10 @=3;P=#8200;C=0;P.$14
 20 ?#E1=0;P.'&P":"
 30 DO P.&?P
 40  IF?P>32;IF?P<127;GOS.a
 50  P=P+1;C=C+1
 60  IFC>7 P.''&P":";C=0
 70 U.?#B001&#40=0
 80 @=8;?#E1=#80;P.$15';E.
 90aP.$8$11$(?P)$10;R.
100 Page mode on
110 CTRL to stop
```

Morse coder

IF you've ever attended an amateur radio show, you would have been struck by the number of enthusiasts using computers to sssist them in their hobby. I know from your letters that many of you are interested in RTTY (the transmission and reception of messages by radio).

Listing 4 (overleaf) is probably the longest program that you'll see in Atom Forum. it allows you to type in English at the keyboard, and your words are then translated to Morse code and output through the speaker. The output is also present on the cassette port (see the technical manual) and may be fed directly into a transmitter. Before you all rush out to buy radio rigs, I'd better tell you about Catch 22 – the Home Office will not grant you a licence to transmit until you pass a test, which involves being able to recognise and send Morse without, as they say, artificial aids. If you have a licence, this program will save your fingers; if you haven't you can practice on it to become proficient in recognising Morse code.

There are two modes of operation. Keyboard mode transmits as you press the keys, whereas Terminal mode lets you write a string (up to 64 characters) which, on pressing return, will be transmitted in one go, with the characters displayed as they are sent.

Simply, the machine code sets up the Morse bleep routine (as in the manual) and a keyscan, which also checks for special keys. The rest of the program is a series of subroutines to make the dots and dashes correspond to the ASCII character. Morse does not have lower case, so the shift key has no effect on the transmission.

Help! Now that I've made a start, perhaps someone would like to send in the opposite routine – to convert received code into ASCII. I am told that there is a lot of information on the airwaves, so let's all share it. page 121▶

Invented a routine or discovered a hardware modification for the Atom? Here's a chance to show your originality and win some cash. Send your idea to: Atom Forum, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

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– Which Micro?, Feb 84

"**Lords of Time.** This program, writen by newcomer Sue Gazzard, joins my favourite series and is an extremely good addition to Level 9's consistently good catalogue . . As we have come to expect from Level 9, the program is executed with wonderful style – none of those boring "You can't do that" messages! Highly recommended."
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Please describe your computer

Listing 4. English into dots and dashes

```
5REM: morse transmit
10 P.$12''''''''"wait...."$30
20 C=#3500;V=#2890;L=#B002
30 P=#2800;T=P;N=P+132
40 W=P+21;P.$21;[
50 \ bleep
60 LDAL;LDY#22B;LDX#22A
70 DEX;BNEP-1;EOR@4;STAL
80 DEY;BNEP-12;RTS
90 \ keyscan
100 LDA#B001;CMP@#7F
110 BEQP+49;JSR#FE71;BCS P-3
120 JSR#FE66;CPY@#D;BEQP+51
130 CPY@0;BEQP+53;CPY@4
140 BEQP+54;CPY@2;BEQP+80
150 TYA;CLC;ADC@32;CMP@#3F
160 BEQP+52;CMP@#3E;BEQP+53
170 CMP@#3D;BEQP+54
180 CMP@#3C;BEQP+55;JMP N
190 JSR#FE71;CPY@#17;BEQP+25
200 TYA;CLC;ADC@32;JMP N
210 \ special chars
220 LDA@#D;STAC;RTS
230 LDA@32;JMP N;LDA@#5E;JMP N
240 LDA@#27;JMP N;LDA@#2F;JMP N
250 LDA@#2E;JMP N;LDA@#2D;JMP N
260 LDA@#2C;JMP N;LDA@#5C
270 \ output & store
280 JSR#FFF4;STAC;RTS;];P.$6
290qP.$12"PRESS 0 FOR KEYBOARD OR"'
300 P."1 FOR TERMINAL MODE ";LI.W
310 M=?C-48;IFM>1 G.q
320REM: delay timetable
330 V!5=#36445773;V!9=#1C1F232B
340 V!13=#090A121A;V!17=#05060708
350 V!21=#01020304;V?25=1
360 P.'''"special characters"'
370 P."@=WAIT SIGNAL"'">=   ERROR"'
380 P."<=   ETX"'"\=   BK"'
390 P."^=   CQ"''''
400mP."TRANSMIT SPEED "
410 IN."(5 - 25 WPM)"S
420 P."PRESS return"';LI.#FFE3;P.$11
430 IFS<5 ORS>25 G.m
440 D=80;G=240;E=3
450 IFS>15 D=60;G=180;E=2
460 IFS>20 D=50;G=150;E=1
470LI.#FE22;P.$30;Y=64;LI.#FE24
480 ?#22A=170;P.$30"ENTER TEXT"'
490 IFM;IN.$C;F.Q=0TOLENC;K=Q?C;P.$K;G.k
500dLI.W;K=?C
510REM: sound sequence
520kIFK=39 GOS.i;GOS.c;GOS.e
530 IFK=39 GOS.c;GOS.b;G.z
540 IFK<44 ORK>94 G.z
550 K=(K-44)*10;GOS.(570+K);G.z
560REM: ASCII order from here
570 GOS.f;GOS.c;GOS.h;GOS.c;GOS.f;R.
580 GOS.j;GOS.c;GOS.h;GOS.c;GOS.i;R.
590 GOS.i;GOS.c;GOS.i;GOS.c;GOS.i;R.
600 GOS.a;GOS.c;GOS.h;GOS.c;GOS.j;R.
610 GOS.e;GOS.c;GOS.f;R.
620 GOS.i;GOS.c;GOS.e;R.
630 GOS.h;GOS.c;GOS.e;R.
640 GOS.g;GOS.c;GOS.f;R.
650 GOS.g;GOS.c;GOS.i;R.
660 GOS.h;GOS.c;GOS.g;R.
670 GOS.j;GOS.c;GOS.g;R.
680 GOS.f;GOS.c;GOS.g;R.
690 GOS.e;GOS.c;GOS.h;R.
700 GOS.e;GOS.c;GOS.j;R.
710 GOS.e;GOS.c;GOS.g;R.
720 GOS.j;GOS.c;GOS.j;GOS.c;GOS.j;R.
730 GOS.i;GOS.c;GOS.i;GOS.c;GOS.b;R.
740 R.
750 GOS.g;GOS.c;GOS.h;GOS.c;GOS.g;R.
760 GOS.h;GOS.c;GOS.f;GOS.c;GOS.h;R.
770 GOS.i;GOS.c;GOS.g;R.
780 GOS.i;R.
790 GOS.a;GOS.c;GOS.g;R.
800 GOS.j;GOS.c;GOS.j;R.
810 GOS.a;GOS.c;GOS.h;R.
820 GOS.b;R.
830 GOS.h;GOS.c;GOS.j;R.
840 GOS.a;GOS.c;GOS.j;R.
850 GOS.b;GOS.c;GOS.g;R.
860 GOS.h;R.
870 GOS.b;GOS.c;GOS.e;R.
880 GOS.a;GOS.c;GOS.i;R.
890 GOS.i;GOS.c;GOS.h;R.
900 GOS.f;R.
910 GOS.j;R.
920 GOS.e;R.
930 GOS.i;GOS.c;GOS.j;R.
940 GOS.f;GOS.c;GOS.i;R.
950 GOS.b;GOS.c;GOS.j;R.
960 GOS.g;R.
970 GOS.a;R.
980 GOS.b;GOS.c;GOS.i;R.
990 GOS.h;GOS.c;GOS.i;R.
1000 GOS.b;GOS.c;GOS.f;R.
1010 GOS.j;GOS.c;GOS.i;R.
1020 GOS.j;GOS.c;GOS.f;R.
1030 GOS.f;GOS.c;GOS.h;R.
1040 R.
1050 GOS.a;GOS.c;GOS.g;GOS.c;GOS.a;R.
1060 R.
1070 GOS.j;GOS.c;GOS.j;GOS.c
1080 GOS.f;GOS.c;GOS.i;R.
1090REM: delay
1100zX=V?S;LI.#FB83;IFM;N.;G.q
1110 G.d;REM: loop back
1120a?#22B=G;LI.T;R.;dah sound
1130b?#22B=D;LI.T;R.;dit sound
1140cX=E;LI.#FB83;R.;delay
1150eGOS.a;GOS.c;GOS.a;GOS.c;GOS.a;R.
1160fGOS.a;GOS.c;GOS.a;R.
1170gGOS.b;GOS.c;GOS.b;GOS.c;GOS.b;R.
1180hGOS.b;GOS.c;GOS.b;R.
1190iGOS.b;GOS.c;GOS.a;R.
1200jGOS.a;GOS.c;GOS.b;R.
```

Disassembling

FOR those who are wondering where the disassembler, promised in the February Forum, is, I was pipped at the post by Bruce Smith in the December '83 issue. Sorry about that!

On the same subject, a number of you have-sent in improvements, as follows:

```
150cP."any key";LI.#FFE3;P.$12;G.e
252 GOS.h;P."(#"; @=1;P.&L",X)"';G.g
253 GOS.h;P."(#";   =1;P.&L",Y)"';G.g
266 P.&L,&A" "$A"(#"; @=1;P.&R;
GOS.z; P.&L")"';N=N+2;R.
```

Line 248: insert a newline character after$A

Line 470: alter JMP6 to JMPB

Thanks to all concerned.

THE January issue of *Personal Computer World* contained details of hitherto undiscovered op-codes for the 6502 processor. I tested these on the Atom and can confirm that they work. I am now investigating the timing and S register effects of these new codes and will report fully next month.

KEYS TO TRANSLATING DIALECT

The second of a three-part series in which Barry Pickles offers a conversion kit for translating Basic from Beeb to Atom

WE LOOKED at some of the keywords in BBC Basic last month and discussed how they translate into Atom terms. In this article we'll cover the remaining keywords and see which VDU calls have an Atomic equivalent, so you should be in a position to undertake the conversion of Basic programs.

Here are the remaining keywords:

***KEY** Bruce Smith's 'Alternative Toolbox' (*Acorn User,* November 1983) showed how to implement this.

MOD This gives the remainder of an integer division. The Atom equivalent is the '%' operator.

MODEx The same as CLEARx. See table 1 for the approximate Atom modes.

NOT A logical operator (see page 31 of the manual). The expression IF NOT (A = B) THEN ... should be translated as IF A <> B THEN ... However, when used in assignments (eg, A%=NOT B%) NOT returns the complement of its operator. Thus, the example would be translated as A=B:#FF.

OFF See ON ERROR.

ON...GOTO/GOSUB A 'calculated' branch. It is followed by a series of line numbers and the branch is determined by the value of the operator. Thus:

200 ON B% GOTO 300, 310, 320, 330

is easily translated to:

200 GOTO (300+B*10)

This assumes that the GOTOS are in ascending line-number order. However, this may not be the case, in which event you will have to do some renumbering and possibly use an IF...THEN construction.

ON ERROR Used, of course, to trap errors. The Atom manual gives an equivalent routine. BBC Basic may make use of the variables ERR and ERL, respectively the error code and line number, held in bytes 0-3 on the Atom. Another use of ON ERROR is to trap the ESC key, usually returning to a menu. In translation, it is simpler to use another key (say CTRL) and disable the ESC key with ?#B000=9

```
10 V=#80;!V=#10204080
20 V!4=#1020408
30 P=#21C;P.$21;[
40 LDA#5A;AND@7;TAX
50 LDY V,X;STY#97
60 LDY@0;LDX@1
70 LDA(#95),Y;AND#97
80 BEQP+5;STX#97;RTS
90 STA#97;RTS;];P.$6
100 CLEAR4
110 X=A.R.%255;Y=A.R.%192
120 Q=X/8+(191-Y)*32+#8000
130 !#95=Q;PLOT13,X,Y
140 LI.#21C;T=?#97
150 X=30;Y=25;PLOT13,X,Y
160 LI.#21C;F=?#97
170 P.$12'T'F';E.
```

Listing 1. Implements the POINT routine

OPENIN/OPENOUT These are file-handling commands. Atom uses FIN and FOUT.

PAGE Exactly equivalent to ?18*256, the start of the current text area.

PLOT See table 2. PLOT 81 and PLOT 85 are triangle-drawing routines, using the previous two x, y values with the ones specified as co-ordinates. You will have to do this the long way round.

POINT Listing 1 implements this routine, which tests whether the point at X, Y is set (lit) or clear (unlit). Lines 10-90 should be inserted at the start of your program and line 120, followed by !#95 = Q; LI. #21C used every time you want to test the point. The result is stored in #97 as logically true or false, shown here in line 170.

SCREEN MODES

BBC Mode	Atom Mode	Scaling X	Scaling Y
0	4	5	5.5
1	4	5	5.5
2	4a	10	5.5
3	0	Text only	
4	4	5	5.5
5	4a	10	5.5
6	0	Text only	
7	0	Text & block graphics	

Table 1. The x, y scaling factor is needed because the Beeb has a standard screen of 1280 x 1024 in all modes

PLOT

Plot No.	Meaning	Atom Equiv.
64-71	Same as Atom	8-15
8-15	As 0-7, but last point omitted, if inverted	0-7
16-23	As 0-7, but dotted line	
Nil		
24-31	As 16-23, last point omitted, if inverted	Nil
72-79	Line fill	Nil
88-95	Line blanking (unfill)	Nil
80-87	Plot/fill triangles	See text

Table 2.

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                        professional machine code programs in a
                  009 ; professional way.
                  010
      =           0011 romv      QRY Rom Version
                  0012
                  0013           cond not romv
1900              0014           org $1900
                  0015           else
                  0016           org $8000
                  0017           endc
                  0018 ;
1900 A200         0019 .start: ldx #0          ;String print routine
1902 BD0E19       0020 1%:     lda mesg,x      ;Get the character
1905 F006         0021         beq 2%          ;Finished?
1907 20E3FF       0022         jsr osasci      ;No- print it
190A E8           0023         inx
190B D0F5         0024         bne 1%          ;and continue.
190D 60           0025 2%:     rts
                  0026 ;

Symbols:

1928 BUF     0015 BUFLEN    1922 DATA    190E MESG    FFE3 OSASCI
0000 ROMV    1900 START

0000 error(s) detected
628F bytes free
```

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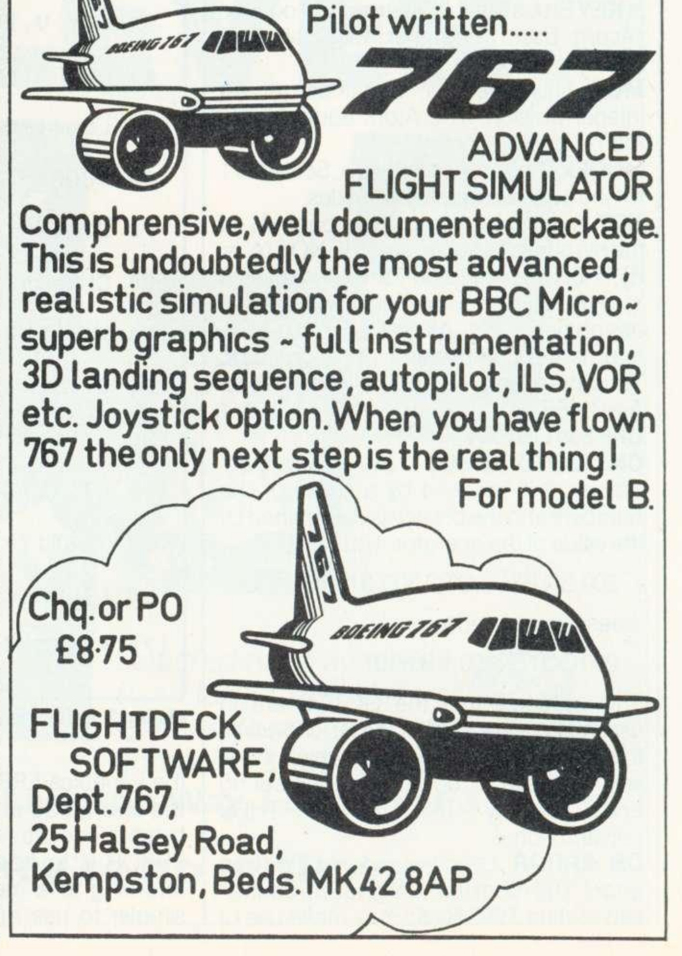
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POS This returns the x, y position of the cursor. In the Atom, the cursor position is held as a vector at #DE, offset by #E0. The X position is ?#E0 and the Y position is ((? # DF*256+?#DE- # 8000)/32). VPOS returns the Y position only.
PRINT This is slightly different on the Beeb, in that it automatically generates a CR/LF, unless instructed not to, by placing a semi-colon at the end of the statement. PRINT sometimes uses the variable % to control formatting.
PRINT# Another file-handling command, literally printing to tape/disc. Use PUT/BPUT/$PUT, according to requirements.
PTR# Same as PTR (DOS only)
REPEAT...UNTIL Same as DO...UNTIL
SPC Prints n spaces.
STOP Same as END.
STR$ Same as STR.
STRING$** Prints the specified string n times, eg, PRINT STRING$(10,"") would print 20 asterisks.
TAB #E0 holds the horizontal cursor position, so ?#E0 = X provides a TAB (X).
TIME See 'Atom Forum' (September '83).
WIDTH Sets the width of the screen. I'm not sure why you should want to do this on the Atom's small screen, but listing 2 simulates it. The width is held in #90.

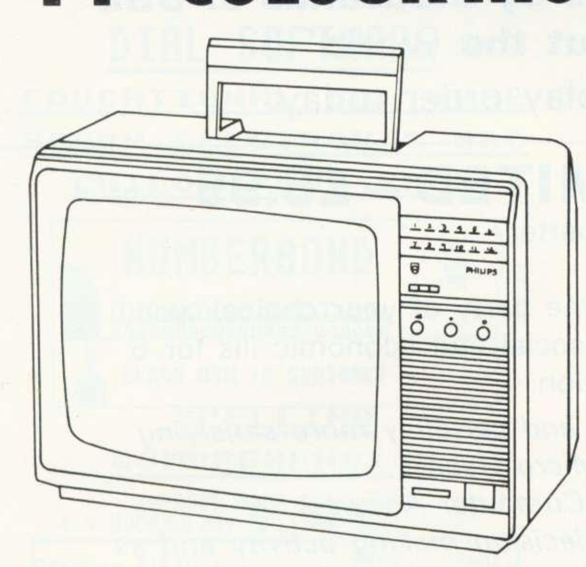
VDU calls are of the form VDUn, where n is a number in the range 0-31. The Atom equivalent is P.$n. A full list of VDU calls appeared in the November '83 issue of *Acorn User*. VDU calls 4, 5, 17, 18, 19, 20, 24, 26, 28 and 29 have no Atom equivalent. VDU25 can be replaced with the appropriate PLOT statement and VDU22 with the appropriate CLEAR statement. A routine to simulate VDU23 was given in the December '83 issue. Note that a statement of the form VDU23;8202;0;0; is used to remove the cursor from the screen. This can be ignored in translation. VDU1 can be arranged by re-directing the WRCHVEC at #208,209 to #FE55. See POS to show how to imitate VDU31. A VDU29 routine was given in the January '84 Atom Forum. VDU calls 1, 16, 22, 23, 24, 26 and 31 are simulated in the Atom Screen ROM (February issue page 154).

The following books provide easy practice at conversion:
'101 Basic Games' by David Ahl (Creative Computing Press)
'The Book of Listings' by Hartnell & Ruston (BBC Publications)
'Twenty Practical Programs' by D Johnson-Davies (Sigma Technical Press)

```
10REM: W=WIDTH
20 P=#21C;Q=P;[
30\ store character
40 PHA
50\ check with w
60 LDA#E0;CMP#338
70 BNE P+12
80\ cr+lf
90 LDA@13;JSR#FE52
100 LDA@10;JSR#FE52
110\ restore char
120 PLA
130\ back to normal
140 JMP#FE52;]
150REM:alter WRCHVEC
160 ?#208=Q%256
170 ?#209=Q/256;E.
```

Listing 2. Sets width of screen

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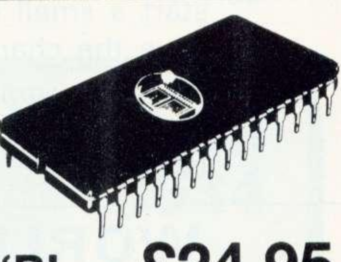
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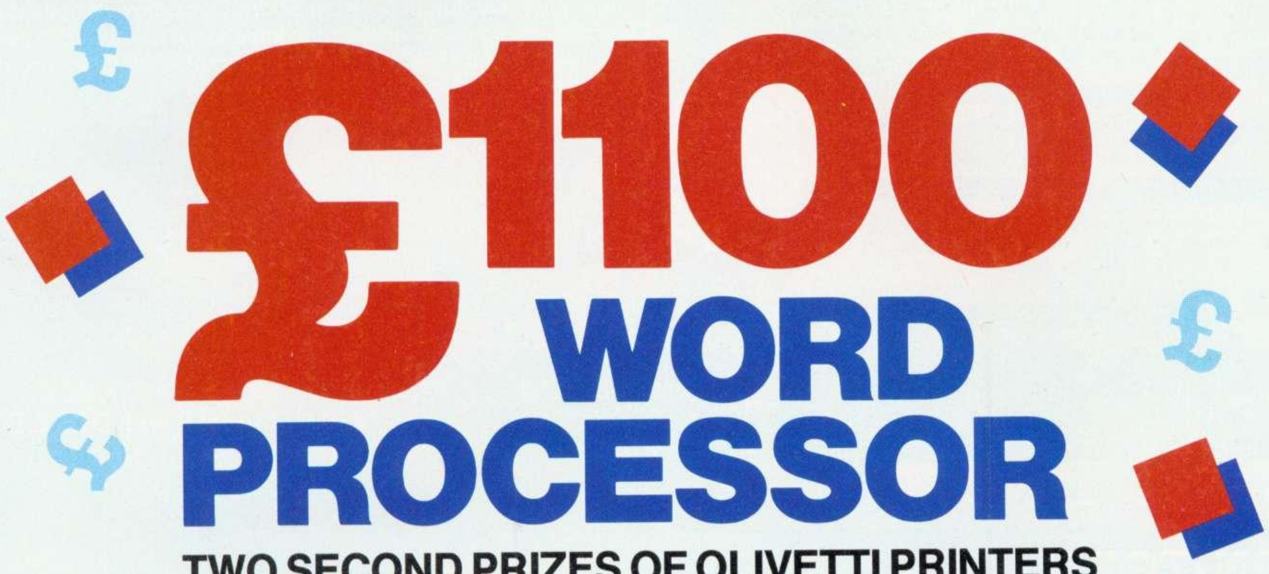
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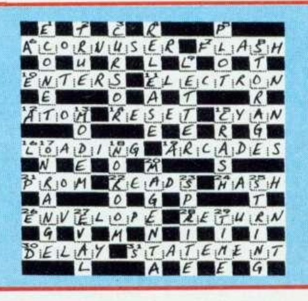
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GRAHAM TYLER of London SW10 was the winner of January's competition to win a BBC micro. The two runners up, who each get an Olivetti ink-jet printer, are Alexa Cruicksanck of Hants, and Mrs S Abbott of Sidcup, Kent. All three winners have been notified. The answers were:

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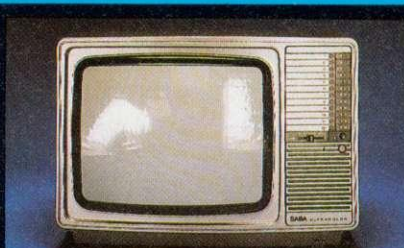
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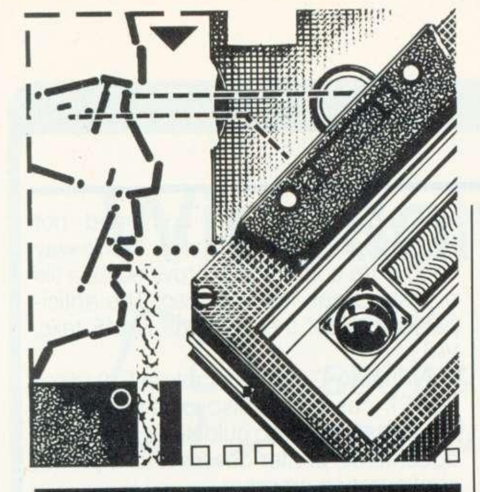
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EDWORD: IN A WORD JUST SUPERB

Edword, BBC A/B, (OS1.0), 16k ROM, Clwyd Technics, Unit 4, Antelope Industrial Estate, Rhydymwyn, Clwyd CH7 5JH, Teacher Pack £18.95 (£21.95 disc), User Pack £38.95, Starter Pack £56.95 (£59.95 disc), excluding VAT

WILL BBC micros in schools end up as nothing more than electronic text books? Given the state of much 'educational' programs, I sometimes think so – until software like *Edword* comes to the rescue.

Edword is a remarkable word processor which has been designed by teachers for children. It might sound impossible to produce a WP for children without compromising its virtues, but *Edword* succeeds.

The system is marketed in a number of forms: the User Pack contains the 16k ROM, a user manual, a self-instruction guide and function key insert (figure 1). The Teacher's Pack comprises guidelines, a set of A3 wallcharts, with transparencies, and a set of information sheets about word processing (figure 2). Printer driver and set-up programs for a variety of printers are provided on disc or cassette. Specimen documents are included for use with the instruction guide. The User Pack is enough to get started, but to make full use of *Edword,* a Starter Pack comprising the User Pack plus Teacher's Pack should be purchased.

The ROM fits into one of the sideways sockets in the BBC micro, and needs operating system I.O. or later. What I find amazing is that *Edword* works in a model A, defaulting automatically to the cassette filing system and a 40-column screen. In this configuration documents are restricted by memory to five pages of 66 lines each. On the model B, text widths of 40 or 80 columns may be selected with a maximum of nine or five pages respectively. Longer documents must be divided into a number of sub-files. *Edword* uses all three BBC storage systems: cassette, disc and Econet.

Typing *EDWORD initialises the program and presents a menu (figure 3). On entering any of the editing modes: CREATE, REVISE or VIEW, the screen is divided into three (figure 4). The working document is displayed in a central window which is blank if the CREATE mode is selected, otherwise the first 19 lines of the document are displayed. The top of the screen is reserved for the system status. Here the document name is displayed, the current mode and the cursor position in terms of page, line and column. 'L' and 'R' indicate the left and right margins respectively. TAB positions are indicated by 'T' and indents by '>'. A number of indicators may also be displayed: for example, Pr for printing or Us for underscore. Three lines are reserved at the bottom of the screen for a command area. Here error messages are displayed and can be used in certain operations for entering data. The REVISE mode is used for editing existing documents, the VIEW mode for checking layout etc. Text cannot be entered while the document is being VIEWed.

From the menu, the FORMAT mode can be entered by pressing the 'F' key. From an editing mode it is accessed via COMMAND F. One of *Edword's* major strengths is its FORMAT mode, which



Figure 1. Prolific documentation

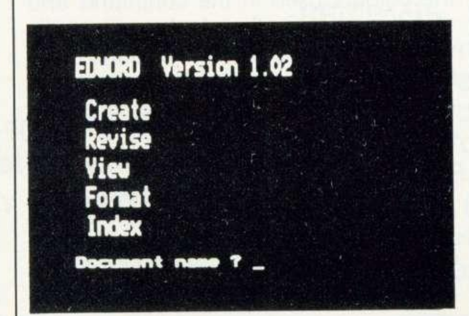


Figure 2. Edword initial menu

allows this complex and often confusing aspect of word processing to be handled elegantly. When selected, the FORMAT screen displays a chart showing the various format settings and their current values (figure 5). Using the cursor keys, values can be entered and altered easily. The screen-based nature of *Edword* comes into its own here as it becomes very clear what your intentions are once back in the editing mode. Children found this feature particularly pleasing. They enjoyed seeing the TAB stops and margins on-screen, and being able to adjust them so quickly and neatly. The TAB stops are used by the BBC's TAB key. Again, the importance of being able to relate what is seen on the screen to what is printed out in hard copy has been recognised by *Edword's* designers. Unlike most of the formatting parameters, line spacing cannot be created on screen and appears only as hard copy.

The philosophy behind *Edword* is simplicity, and the most common operations are available as single-key inputs – an approach which puts the BBC micro's function keys to excellent use (figure 6).

When an object key is pressed the object at the cursor position is illuminated as black text on a white background (figure 7). Any one of the five operations keys may be pressed to perform an operation on the selected object. This is all that really need be learnt to get started. For example, should you wish to justify a paragraph you place the cursor at the beginning of the paragraph, press f2, then f7. Simple.

Put the cursor at the beginning of the page and press f3 and f7 and the page will be justified. Touch the wrong key and pressing f7 will result in a beep, showing an error has occurred. Pressing f4 will give further information. The most valuable aspect of this is that children can really see what is happening.

Naturally, 10 function keys can't cover all the operations one would like in a WP. Access to the less common commands is obtained by using the f9 (COMMAND) key. All further operations are then available as single key inputs. As these are usually mnemonic they are quite easy to remember (figure 8 shows some of them).

Moving the cursor around the page is also logical and simple. To move the cursor to any one position (ie: line up, line down, one column right/left), then the cursor (arrow), keys are used. You can move the cursor to the extremes of the line/document using the COMMAND key. Also, the screen may be scrolled up or down while the cursor remains stationary.

Entering text is easy: place the cursor at the required position and type. *Edword* defaults to an insert mode whereby words are re-arranged to prevent them being split across lines. COMMAND 'O' selects the overtyping mode and new characters replace existing text.

A great deal of thought has gone into choosing the keys. The system is really easy to use and the usual familiarisation problems of introducing WPs to my 10-year-old pupils just didn't arise. My major gripe concerns the disastrous effect of accidentally pressing the break key: the entire contents of memory are irretrievably lost!

A good number of children fell into this trap which is exacerbated by the much-used COMMAND key (f9), being right next door.

Edword has an INDEX mode which is

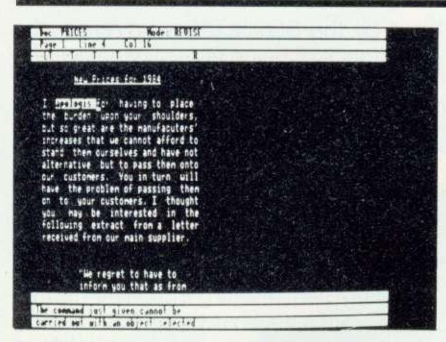


Figure 3. Edword screen mode

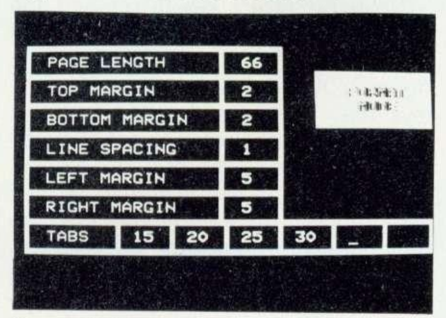


Figure 4. Format options

available with discs, which simply allows you to display a catalogue. It is available either through the main menu or COMMAND 'I'. I found this a disappointment as none of the usual disc filing system commands can be used, which inevitably limits file handling.

Printing a whole document, or a section, is extremely easy, however. It is initiated by pressing f8. The message 'Is your printer ready (Y/N)?' is displayed. The children particularly enjoyed watching the cursor travel through their document as it was being printed. Printing can be interrupted at any point by pressing Escape.

Although *Edword* is customised for the Epson MX82 F/T III, it may be configured for other printers using the printer file generator program provided. With a little knowledge of your printer's control codes you can soon be underscoring and using bold text.

Edword comes with the most thorough documentation I have ever seen: even installation runs to four pages. There is really no excuse for fitting the chip incorrectly. The word-for-word guide takes you through all *Edword's* facilities and it is an excellent starting point for those new to word processing. The only problem I encountered was that a number of pages did not relate to those of the index.

As a handy guide, the User Reference Guide is superb, with each command/operation given at least a page. Colour, screen shots and highlighted text make even the most difficult sections easy, and the wallcharts and transparencies are of a high standard.

However, there are some criticisms. These do not concern what has been included, but what is missing. We have come to expect more from a WP, and the features I would like included are:

- a routine to trap the break key.
- a pad character.
- a specification of which disc drive is in use.
- a swap case facility.
- the ability to delete a document without returning to the menu.
- access to DFS commands.
- access to '*' commands.
- automatic headers, footers and page numbering.
- the ability to edit Basic programs and ASCII files.

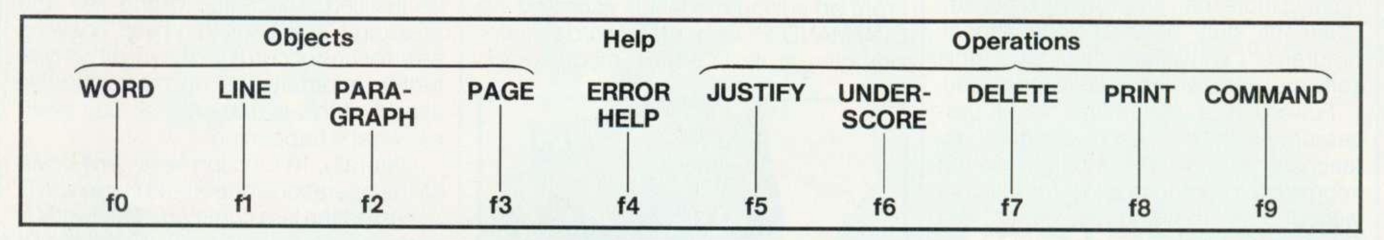


Figure 5. Function keys

I spoke to Clywd Technics and discovered that an additional package, *Edword+*, is to be released including most of these. In addition, *Edword+* will allow control over the screen foreground, background and the colours used in the command and status areas. Further features include: unjustify text; specification of page number; save and replay a sequence of *Edword* commands; index a specified drive.

Edword+ will be supplied on disc and includes its own reference guide. It will enhance the Edword User Pack, and is not just an improved version of it. A loader will be provided which *Edword* copies into a reserved area of memory. The loader will look on disc for any command not recognised by the ROM chip. In this way each extra command is provided as a file of instructions held on disc. The anticipated price of the package is £15 (exc. VAT).

A Primary Guide available at £10 (disc) and £7 (cassette) is also to be released. It comprises teaching guidelines, specimen documents, printer drivers and a printer configuration program.

It is difficult to arrive at any conclusion other than that this is a thoroughly professional piece of software truly designed by educationalists. At £60 plus VAT, it may seem expensive for one item of software, and I would suggest that any purchaser working within a tight budget obtain the User Pack and add a Teacher's Pack later. Ideally, each school should aim to start with one Starter Pack. Primary schools, however, would do better to purchase a Primary Guide rather than a Teacher's Pack.

Chris Drage

Figure 6. Relevant text illuminated

Figure 7. Command key functions

Select object using f0, f1, f2 or f3 if necessary	P R E S S	and	R	Replace string
			S	Search for string
			C	Centre object
			D	Delete object
			K	Keep object
			M	Move object
			P	Split paragraph
			H	Cursor home
	f9		N	Next screenful of text
			L	Last screenful
			T	Cursor to top of document

FOUR HORSES FOR THOSE SPRITE COURSES

Sprite-Gen, DACC, 23 Waverley Road, Hindley, Wigan WN2 3BN, £17.95
Sprite Master, Soft Machine, 3 Station Crescent, Westcombe Park, Blackheath, London SE3, £9.95
Sprite Utilities, Beebugsoft, PO Box 109, High Wycombe, Bucks HP11 2TD, £10, disc £12
Sprites Version 2, Simonsoft, 25 Tatham Road, Abingdon, Oxon OX14 1QB, £12.95

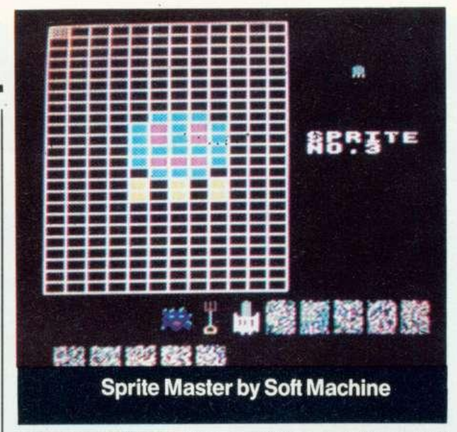


Sprite Utilities by Beebugsoft

THE major problem for Basic programmers writing arcade games on the BBC micro (apart from the small amount of memory left in mode 2) is the lack of built-in 'sprite' routines. Now, what are these sprites that software houses are queuing up to give us? A sprite may be considered as a multicoloured user-defined character which is controlled by machine code routines. It can be made to move smoothly and quickly around the screen without having to write a program in anything more awkward than Basic. The ideas has been implemented on some micros.

When using any of the four packages under review, the first task is to define the required sprite shapes. This is done using a definer program, and these take the form of a grid drawn on a mode 2 screen, on which the sprite is built by using a cursor to fill in squares. The size of a sprite may vary from a single pixel up to, in one case, nearly a hundred in each direction. DACC's *Sprite-Gen* and the standard Simonsoft sprites have a maximum size of 7 x 8, although the Simonsoft product allows 'supersprites', more of which later. Beebugsoft's routine uses a basic cell of 8 x 16 and Sprite Master provides a grid of 96 x 96.

Once defined, the data for each sprite is stored in a reserved area of RAM. Other sprites may then be defined using the same program. Each package allows different numbers of sprite designs; in the order of the heading they are 8, 7, 16 and 12. In addition, three of the routines will allow a number of copies, or 'clones', to be created and moved independently of their parent designs. A total of 32, 21, 16 and 48 sprites respectively may be controlled by the four programs under review.



Sprite Master by Soft Machine

The ease of use of the definers varies considerably, with the DACC routine the most cumbersome (three keystrokes are required to colour in each square of the grid) and the Beebugsoft version showing head and shoulders above the others. This program offers the definite advantage of being able to store each sprite individually by name, thus allowing a library to be built up for future use. It is also the only program available on disc which speeds up the creation of sprites considerably. Simonsoft has, however, designed the program to be easily transferable from cassette.

All the programs except *Sprite Master* allow two separate images of each main sprite to be created and displayed alternately from within a program. Some quite sophisticated animation can be built up using this combined with judicious use of the eight flashing colours. Beebugsoft and Simonsoft allow several individual sprites to be moved around as one larger sprite – a 'supersprite'. The size of *Sprite Master's* character makes this unnecessary, and it is also the only product to offer sprites in all graphics modes, excluding 7.



Sprite-Gen by DACC

When using sprites within a Basic program, all but *Sprite Master* employ a syntax of the form:

```
100 A% = 100: B% = 100: Z% = 0:
    CALLY%
```

Each of the main sprites (and their respective clones) is assigned two integer variables to take the *x* and *y* coordinates of the position they are required to occupy. The number of the sprite or clone is then assigned to another variable and a call made to the sprite routine. Thus, in the above example, sprite 0 would be displayed at the given position. With sprites you do not need to delete the character from its previous position, as this is taken care of by the code. All the programs use EOR plotting, so the colours of the sprites will vary when they pass over coloured backgrounds or each other. The Simonsoft sprites get over this with a routine which will restore any given background after a sprite has passed, while at the same time maintaining its true colours at all times – clever! Beebugsoft and Simonsoft programs also offer other methods of moving sprites. The Simonsoft is the more versatile in providing repeating flight paths which may be predefined for any sprite. These may take the form of quite complicated patterns of movement. This program also allows the enlargement of any sprite in stages up to five times its normal size. All but the DACC program include routines to detect collisions.

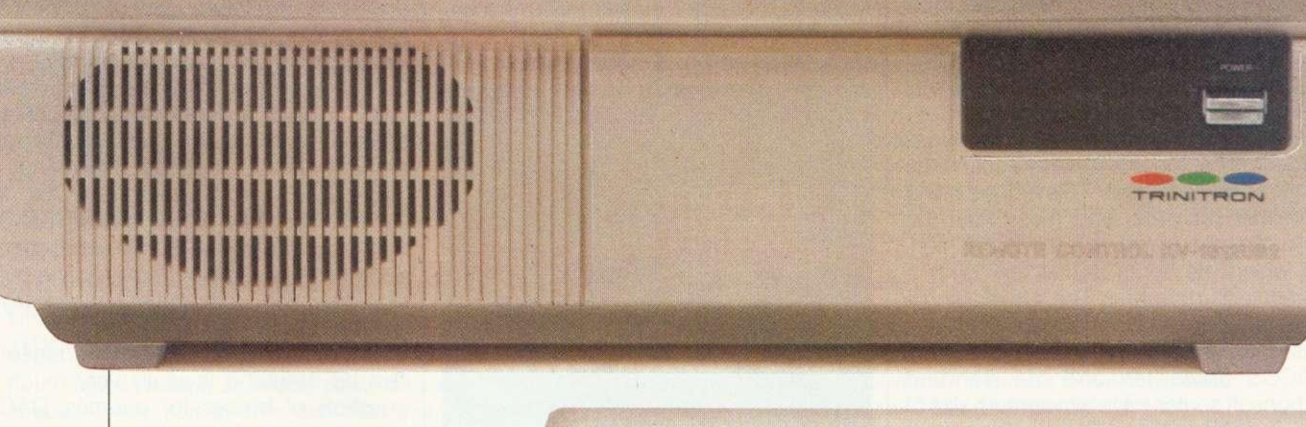


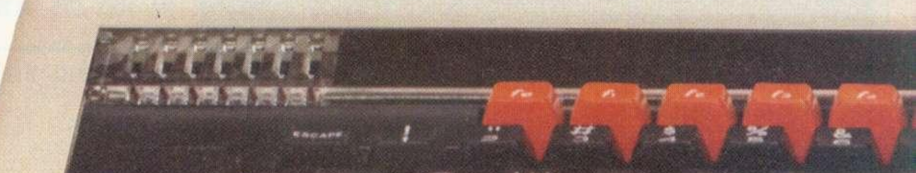
Sprite 2 by Simonsoft

All the sprite routines take up some user RAM to house code and character shapes, and each uses a different amount. DACC houses everything in 1.25k, Beebugsoft uses 2k (2.75k for supersprites) and Sprite Master fills 3k. Simonsoft supplies 20 different routines, depending on whether you require collision detection, enlargement, preset flight paths etc, between 1.75k and 4.25k.

Out of all this, what recommendations can be made? It is really very much a question of horses for courses; DACC manages to pack a useful program into a small amount of memory, but without collision detection, and a lot of extra Basic may have to be written to achieve this. *Sprite Master* is the only one to offer multi-mode sprites, and large ones at that. For my money though, *Sprite Utilities* wins through for its ease of use in most applications, with the Simonsoft product coming into its own when the extra facilities are needed. **Simon Williams**

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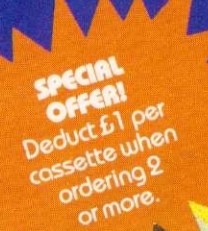
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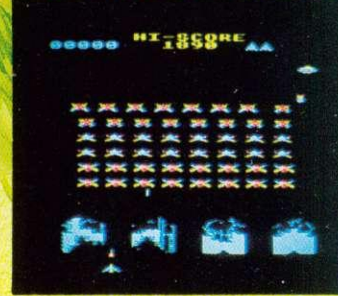
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ACORN ELECTRON





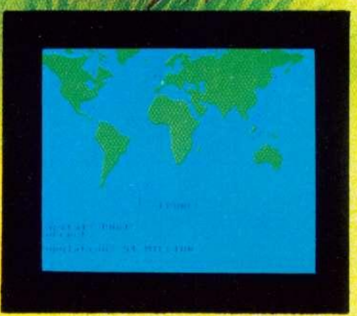




CENTIBUG £7.95
The centibug descends from the top of the screen weaving intimidatingly between the mushrooms. Your objective is to shoot all the segments of the centibug before it reaches the bottom of the screen.
Features include: spiders, snails, flies, 6 skill levels, hi-score, rankings, and increasing difficulty.

ALIEN DROPOUT £7.95
A novel and unusual program. Arcade-action with this exciting multi-stage shooting game. The objective of the game is to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground. The game features include: 6 skill levels, rankings, hi-score, increasing difficulty.

INVADERS
48 marching invaders drop bombs that slowly erode your defences, and two types of spaceship (normal and double speed) fly over releasing large bombs that penetrate through your defences. Increasing difficulty, hi-score, rankings, superb graphics and sound.









WORLD GEOGRAPHY £7.95
This program covers 166 countries which are divided into 8 categories of difficulty. Each country is pinpointed on an accurate hi-resolution screen map of the world, and the user is asked the capital and/or population. At the end of the test, the percentage of correct answers is given, so that the student can easily monitor his increasing geographical knowledge.

FRUIT MACHINE £7.95
Probably the best fruit machine implementation on the market. This program has it all . . . HOLD, NUDGE, GAMBLE, spinning reels, realistic fruits and sound effects, multiple winning lines. This is THE fruit machine program to buy.

CONSTELLATION £7.95
This fascinating program enables the user to "view the stars" from any point on the Earth's surface, on any date and at any time. A total of 455 stars in 50 constellations may be viewed, and the "telescope" may be moved up, down, left or right, zoomed in or zoomed out. The stars can be displayed by magnitude or constellation.

DISASSEMBLER £7.95
A relocatable disassembler which, unlike some similar programs, allows the disassembled source code to be output to memory. It may then be modified and re-assembled. Other features: page-mode option, output to printer if required, output of ASCII symbols if required.

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Really flying

Aviator, Acornsoft, BBC B, £14.95 (disc £17.95)

AVIATOR is not one of those 'fly around an empty landscape' jobs. It has been carefully thought out by author Geoffrey Crammond to produce a three-dimensional landscape in which you and your Spitfire must perform aerobatics to gain points. A second challenge can be attempted whereby the aim is to seek out and destroy aliens who are intent on wiping out your fellow countrymen. This particular aspect has been curiously named 'The Theme', but is a novel approach. More on that later.

The black and white screen display in mode 5 consists in the lower third of a dashboard based on the Spitfire and, in the upper part, a cockpit view. The dashboard has a fuel gauge, altimeter, ASI (air speed indicator), artificial horizon, compass, rudder position indicator, slip and turn indicator, VSI (vertical speed indicator), throttle setting, radar (a modern addition) and dashboard lights showing the position of flaps, brakes and undercarriage. There is also representation of the Spitfire's joystick position.

The fighter can be controlled by either keyboard or joystick, though without doubt it is easier to use a joystick.

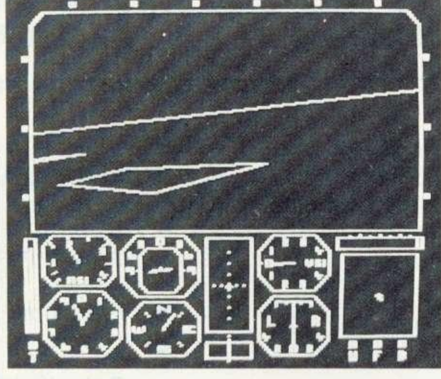
A 25-page manual covers all aspects of using the simulator, from the aircraft controls to looping the loop and rolling. A map of *Aviator*'s world is provided – essential for the new user.

Having glanced at the rudimentary map, I threw my manual aside and set out in search of the river and bridge it displayed on my first attempt. Taking off was easy, and this gave me my first taste of the realism of this package. The cockpit view bobbed in response to my eager but inexperienced joystick control, yet despite such failings I found myself speeding down the runway. I pulled back on the joystick and the runway fell from view and I was up, up and away! Once level at 2000 feet, I decided to turn west towards the river. Banking slowly, and with a few hiccups, I soon saw its outline.

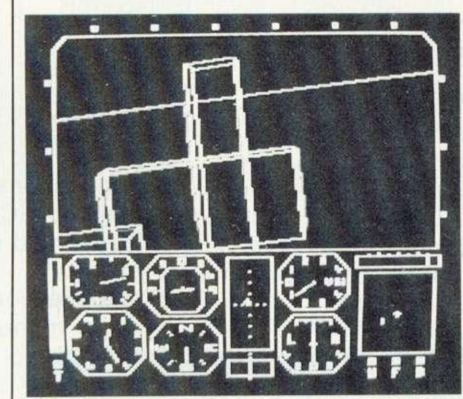
The landscape is indeed 3D though it is difficult to judge distances as the features from trees to mountains are sparse and drawn as stick images.

With more practice I decided to fly under the bridge – one of the skills for which points are awarded, but no easy task. Double points are awarded for doing this upside down. But, needless to say, Boy Biggles 'pranged' and after many hours has only managed the task twice!

Other points are earned for flying



Typical Aviator landscape



Approaching Acornsville

through any street in the game's only town, Acornsville, at a height lower than the lowest building. Unlike the bridge, which looks like the Humber crossing, the town appears more of a jumbled mess, and discerning the streets from buildings takes some getting used to. It is, however, a tremendous challenge and takes some practice.

Finding your way around the landscape is aided by trees and fields, the fields each having a unique shape. The radar screen covers an area of 25 miles by 25 miles and the map shows an area 15 by 15 miles.

For The Theme mentioned earlier the Spitfire's guns and sights can be used. The aliens attack in waves of eight, each subsequent wave getting faster. Points are scored for destroying the aliens (portrayed as darts), which vary in size. If one of them makes it to Acornsville the game is ended.

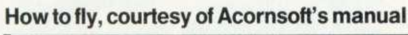
My first reactions to *Aviator* were of fascination and appreciation. Having now used it for many hours that view has not changed. A major drawback with BBC simulators so far has been the lack of a cockpit view. This package is the first of its kind to incorporate all the features necessary for a realistic simulation. *Aviator* is in a class of its own as it gives a sense of really flying.

The cockpit view does not abound with fancy graphics and the landscape is simply line drawings, but there is a strong sense of realism as the perspective of, say, the bridge grows as you approach. Memory is at a premium in programs of this kind and it is quite an achievement to produce a simulator with these graphics, which respond very well to joystick movement, if anything a bit too quickly. The sound effects of the engine are extremely effective and the volume level can be adjusted.

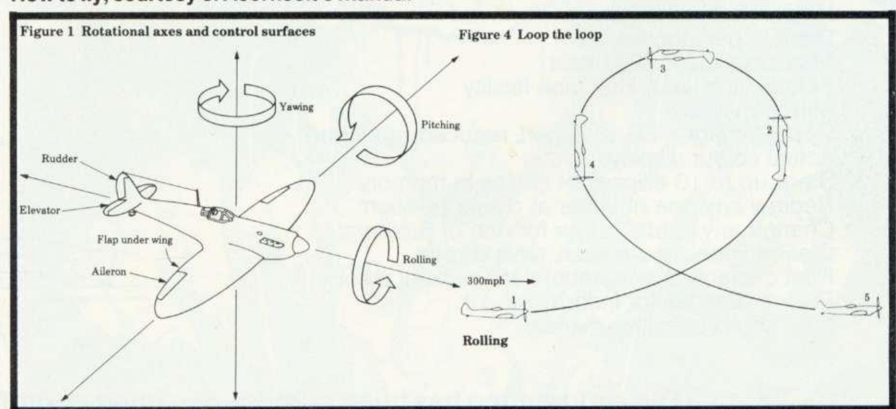
The choice of a Spitfire is ideal for the aerobatics, and apparently the simulator will allow you to do only that which can be done in a real Spitfire. Try anything else and you'll find yourself plummeting towards the ground in a dreaded spin!

Acornsoft has in the past set the standards for BBC software, but of late has been slow to produce programs. *Aviator* has well been worth the wait. It scores top marks in every category, and is one of the most enjoyable games I have ever played.

Dee Vince



How to fly, courtesy of Acornsoft's manual



HINTS ON PLAYING AVIATOR

FIRST of all, use the joystick – it's much easier. Next, do everything slowly, or you'll end up in a spin. Judging distances takes some getting used to, especially as you approach the bridge and turn, so take it easy, and be sure to cut back on the throttle once airborne.

When playing The Theme, watch out for aliens coming from fields near Acornsville. Destroy them first, then refuel before coming back for the rest. Don't get too close to the aliens as you shoot them down, otherwise the spitfire will be affected by the turbulence.

FRUITY QUEST IN THE ROUND

The Quest for the Holy Grail, Epic Software, BBC B, £7.95

YOU walk into Camelot one day and find King Arthur. You ask to become a knight of the round table. First, he says, you must prove yourself worthy. Your quest will be to find the Holy Grail and return it to Camelot. Everyone gasps, but Arthur is adamant. He tells you of the magic fruits of the forest, and how to use them. And off you go.

The problems soon start. First, I had my only defences smashed apart by a black knight. I started again and this time it was the blue knight. It was going to be one of those days! Eventually I left the knights alone and, after drowning numerous times in a swamp, ventured into the castle. There I discovered how the swords worked, found all the fruit ... and started again when I discovered that I had done everything in the wrong order. With hindsight, though, you should be able to fight your way through to the grail. On the way, though, you'll be saying 'If only I had ...' or 'why didn't I ...?' It took me many runs through to win, and a little help from the author (all in the interests of a complete review, of course).

Of the three Epic adventures, I found *Quest for the Holy Grail* the most gripping tale, and its construction is excellent. Trying to cheat is not advised – just dump the memory to find out why! You have many objects to find and many problems to solve. Some are simple, some harder, others just require a little thought.

You've got to buy this one!

Stuart Menges

NOT ONE TO DE-KLINE

The Kingdom of Klein, Epic Software, BBC B, £7.95

LIKE the others in Epic's range of text-only adventures, *The Kingdom of Klein* is very enjoyable. Although it contains more than 220 locations, it occupies only 25k of RAM. All games in the Epic series can be used with a disc system fitted.

Klein is a machine-code program. Response time is very quick indeed, and any adventurer will be gladdened by the precise messages received. For example, if you cannot do something, you are given a clue as to why. For example: 'You can't do that here' and 'You can't do that at the moment' signify respectively that you are in the wrong place and you are without a certain object. Colour is also used on-screen to good effect.

Much thought has gone into planning the plot. You must find a Klein bottle and return it to the pedestal from which it was stolen by the evil witch. You'll meet her on the way, as well as one or two mathematical shapes and the Moebius ravine. There's a maze with a message, too.

Everything must be completed in the right order. You are supplied with the means to move about between locations, but if you aren't careful you lose your powers.

Having killed the witch (clever one, that) and negotiated *that* ravine, you can search for the bottle and return it. I've run out of spells now, so I'll have to back-track. Everything is very logical if you take time to think about it.

This is a first-class storyline with many interesting locations and problems. Everything is logical and believable, a good plus for any adventure game. *Klein* is worthy of any program library and good value at £7.95.

Stuart Menges

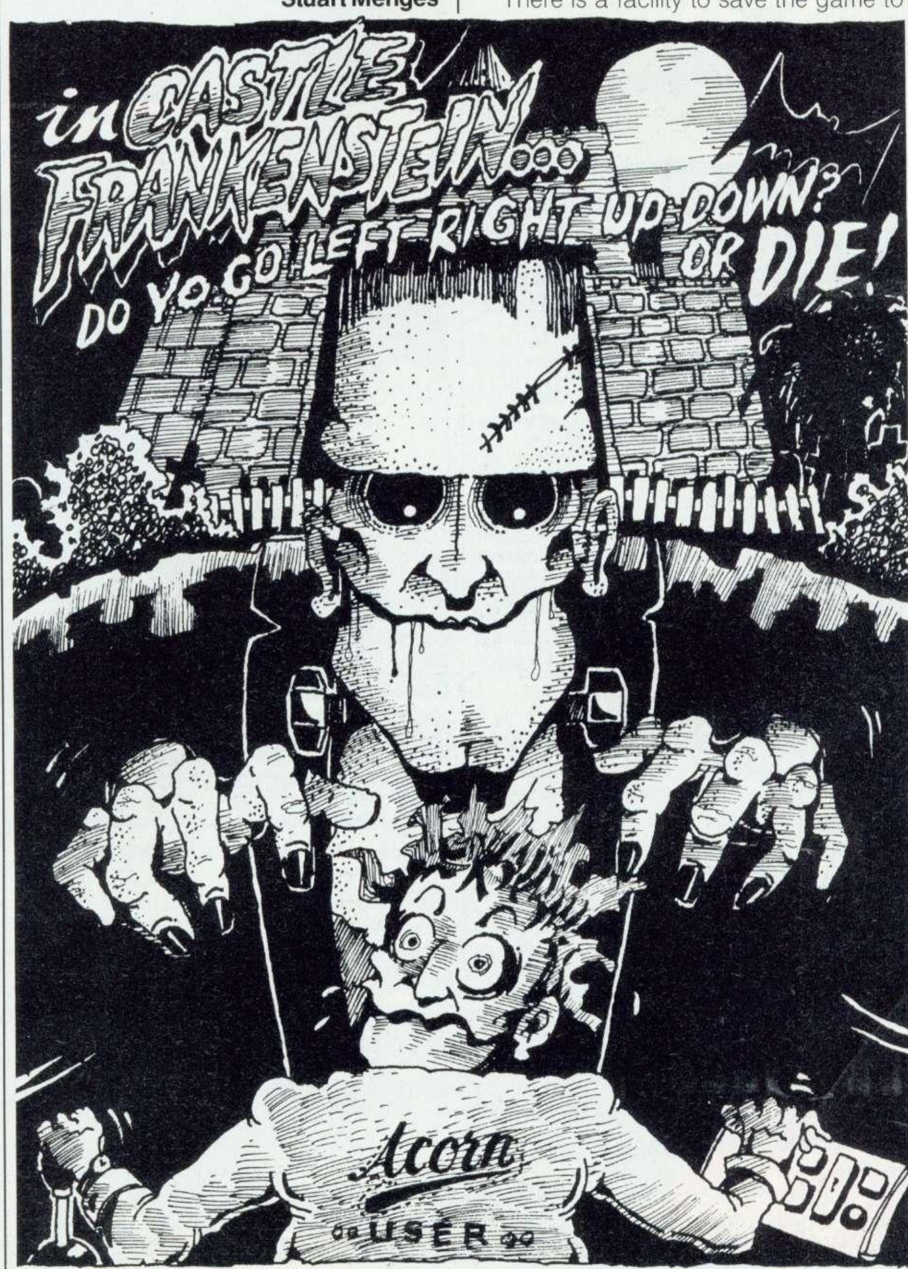
JUST A HUNCH

Castle Frankenstein, Epic Software, BBC B, £7.95.

YOUR task in Castle Frankenstein is to search the ruins and grounds of Frankenstein's old castle for his creation and kill it. The monster was thought to have been killed 20 years ago in a fire at the castle, but after a series of recent murders the village lives in fear. You've got to take your life in your hands in your search for the monster.

This adventure may be run from tape or disc, but it contains 230 rooms and many objects and problems. As with the other Epic quests, you are given adequate instructions, and a list of the most basic words from a vocabulary of about 140. You can use abbreviations in almost every case.

There is a facility to save the game to



tape: this is very quick, being about two blocks long.

The program is written entirely in machine code, so response time is quick. Colour has been used on-screen to liven up the presentation, a feature of all Epic games that should be more widely used. The messages you are given are of real help in finding out what purpose objects serve or why you can't do the obvious. For example, you get different messages if you're trying to do the impossible, you're in the wrong palce, or you need an object you haven't got.

As the game starts you find yourself in an inn in the village. Soon you'll encounter a shop where you can buy things and a forest. Now the clues start to fit together. An interesting feature is the way getting killed or falling down pits can be useful – you'll see what I mean after killing Ygor (the hunchback) and being killed by the monster.

The content is excellent, the game holds together well and is fun to play. Like the other two Epic games, it is good value for money at £7.95.

Stuart Menges

SLICK TIME FOR THE YOUNGSTERS

Franklin's Tomb, Salamander Software, BBC B, £9.95

THIS is a slickly presented but small adventure, likely to suit the younger player. The packaging, the pictures in the so-called 'case file', and the setup of the screen while you are playing are all smooth and convincing, but otherwise, *Franklin's Tomb* doesn't quite live up to its promise. The main part of the game lacks cohesion; you wander from an aquarium to rooms with beautiful murals, into a bathroom a prison complete with torture chamber, and on to something called the 'star-gate'.

A few of the puzzles are very neat. There is a room with cables running from floor to ceiling, but I won't tell you how to use it as it would spoil the fun. Apart from these few high spots, the game is not very captivating. There are too few locations, just one ordinary, rather large maze, and a paucity of good puzzles.

Several of the unforgiveable sins of adventure software are committed. There are no fewer than five spelling mistakes, and any rude word fed in will come straight back at you from the computer. The input is otherwise very rigid.

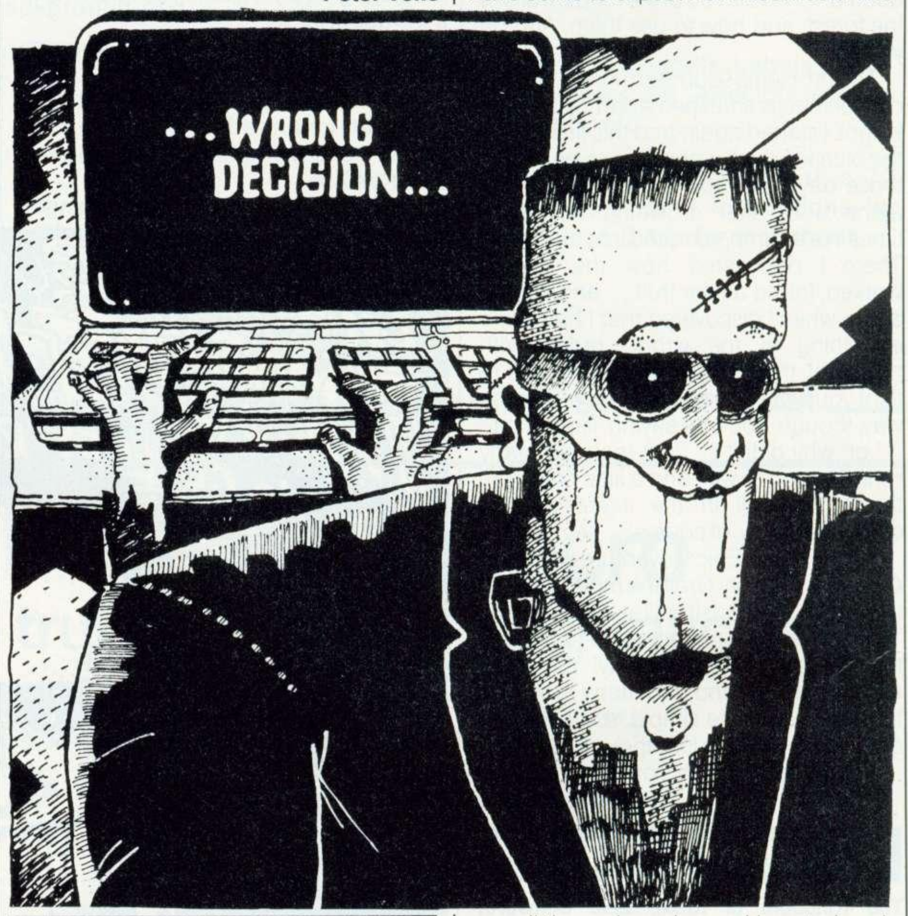
For instance, you cannot put more than one space between the two words you allowed to enter, nor add any extra words.

A couple of good ideas founder on details. The games provides function key entry, but it is easy to crash the program by, say, putting a long string in key 7 before loading. And key 9 is too close to break, which is not disabled in any way.

The screen layout also turns out to be a handicap. Your inventory is always displayed, and all the available exits, but this leaves only a 9 x 18 box for location descriptions and an inadequate strip at the bottom for input. Any objects you encounter are described in this strip and a long list of many objects won't fit.

So *Franklin's Tomb* gets a C+: could do better. Let's hops Salamander will do just that with parts two and three.

Peter Voke



IRRATIONAL BUT HILARIOUS

Kingdom of Hamil, Acornsoft, BBC B, £9.95

THIS mind-teasing adventure comes from the stable that produced *Philosopher's Quest, Castle of Riddles* and *Countdown to Doom.* If you enjoyed those, you will probably enjoy this one. It has the same strengths and weaknesses.

Kingdom of Hamil starts off with a simple entry-game, probably simpler than any of the others mentioned, even *Philosopher's.* So you are rapidly into the main game and find you can move about completely at will, entering one subgame or another by going in various directions. It has just the right mixture of easy puzzles to keep you buoyant and difficult ones to tantalise.

There is a strong air of irrationality about the world you are exploring. At one point you can climb onto a plain rocked by earthquakes and right next door you find a 'lost world' full of prehistoric creatures. Unexplained museums and mazes full of snarks jostle with a baby dragon, an enchantress and a vampire.

In spite of this, the atmosphere is good – something autumnal and Grecian seems to pervade the game. The puzzles are mostly excellent, as adventure addicts have come to expect from Acornsoft. The overall theme is codes and how to break them, so be prepared to think a bit. The solution to the vampire problem is hilarious, and the use of the baby dragon most original. There are no fewer than five mazes, which have to be solved in special ways. The maze of Hamil eluded me. The lost world is a brilliant idea that deserves a whole adventure, and guess what happens when you enter the field of magic maize?

The most frustrating aspect is an object that seems to have a will of its own, since you keep leaving it behind without meaning to.

Acornsoft will supply hints and answers to the puzzles, which is a good idea long overdue. The game is slow in reacting since it is in Basic, but good value, and it looks as if it might be the first of a sequence.

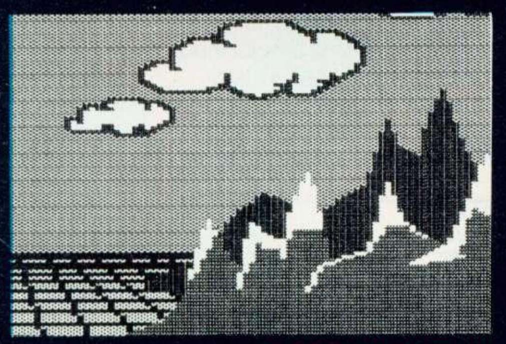
Peter Voke

For the BBC Micro

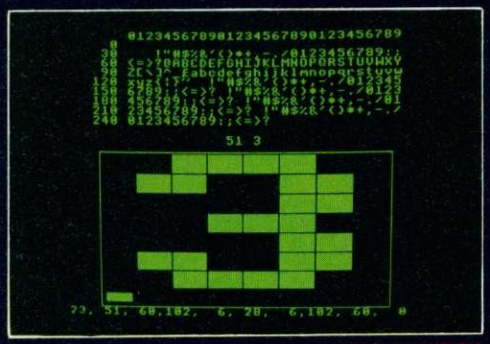
ROMS

ORIGINAL SCREEN DISPLAY

WHOLE SCREEN DUMP



ENLARGED PART OF SCREEN



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GRAFPAD COULD USE A GUIDING HAND

Grafpad Graphics Tablet, British Micro, BBC B, £143.75

HOW can you transfer a picture from paper to the screen of your BBC micro? For simple examples, keyboard input and suitable software will do the job, but more difficult cases will require a 'graphics tablet'.

'Both the manual and the software supplied leave something to be desired'

Two main forms of graphics tablet can be used with the BBC micro. The most common and usually the cheapest is a pantograph arm arrangement, one end of which is fixed, the other holding a pointer. Two of the joints house potentiometers that are connected to the analogue input port of the computer. By applying elementary trigonometry to the values returned by the port, the angular displacement of the arms is translated to linear co-ordinates of the pointer. How accurately the co-ordinates compare with the position of the pointer depends on the linearity of the potentiometer tracks and the rigidity of the arms. Variation in quality of construction is reflected in the price range of such devices – from under £20 to more than £140. The quality of software supplied also influences the price.

A number of articles have been published giving constructional details for a pantograph arm. My experience with one of the cheaper models and with a home-constructed version, using good-quality potentiometers, indicates that while this type of graphics tablet is useful for entering endpoints, an attempt at freehand drawing results in wobbly lines. I suspect that this is mainly due to the problem of reconciling overall rigidity with free rotation of the potentiometers. Some initial calibration is necessary with this type of device but I had difficulty in making lines appear truly horizontal and vertical over the whole area of the screen.

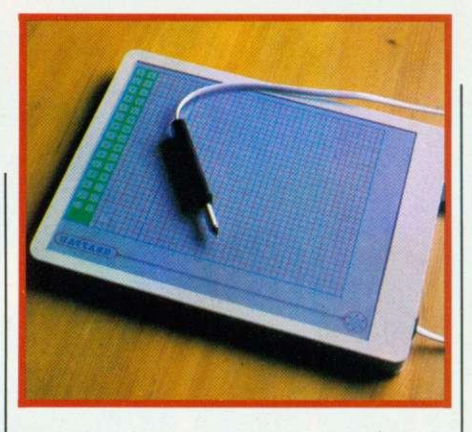
The Grafpad from British Micro operates on a different principle, a type more likely to be found in professional CAD applications. It is a digital rather than an analogue device and generally returns more accurate results without the need for initial calibration. As a result it avoids many of the problems of the pantograph-type devices.

These tablets usually consist of an embedded grid of fine wires and a stylus whose location is detected by electromagnetic coupling between it and the wires, but some work on an acoustic principle. I suspect Grafpad is of the electromagnetic type, as it seems to be upset by anything conductive placed on the tablet near the stylus. The manual in fact warns against tracing heavy pencil drawings. In practice, I found that normal pencil lines caused no problem, and nor did monochrome photographic prints, despite the metallic silver image. However, some magazine photographs gave erratic results – presumably the ink or paper was conductive or magnetic.

The tablet is housed in a cream plastic case which matches the BBC micro cosmetically. It is about 35 x 26 x 2.5cm overall, with an active area of 26 x 19cm, engraved with a 20 by 16 grid. Each square of the grid can be resolved by the stylus into 16 x 16 points, giving an overall resolution of 320 x 256 points – matching graphics modes 1 and 4. The resolution of the pad's surface is said to be 0.75mm.

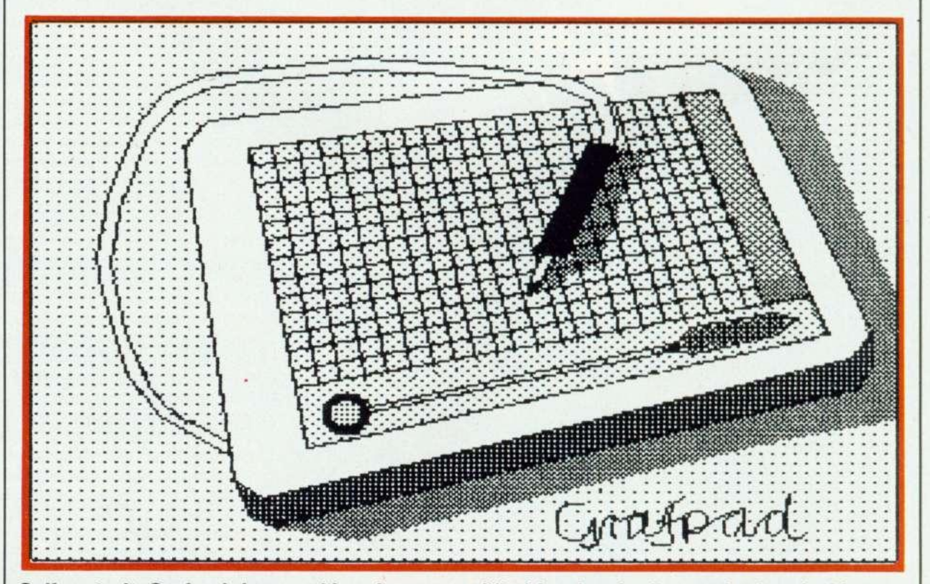
To the right of the grid is a menu selection area divided into 28 smaller squares labelled A to X, plus 1 to 4 and two circles labelled 'C' and blank. The stylus is connected to the left of the tablet via a small six-way plug. The tip of the stylus actuates a micro-switch that enables its position to be read when depressed slightly. The connecting cable is thicker and stiffer than I would have liked for general freedom of movement – presumably because it has to carry six conductors.

The tablet connects to the user port via a ribbon cable, whose length does not allow it to be used remote from the computer – if you use it on the left-hand side of the micro there is virtually no freedom of movement, which could be inconvenient for left-handed people or if you simply want to place the tablet to the left of the computer.



British Micro's ads say the company intends to 'do for colour graphics what Sir Clive Sinclair has done for personal computing'. Presumably they hope to make graphics more accessible by making the hardware more affordable. The tablet costs £143.75, which is more than most pantograph-based devices but appears a good deal cheaper than most other tablets of its type. It's certainly cheaper than an Apple tablet, for instance, but this comes with some fairly sophisticated software. To take full advantage of these devices a lot of software is needed, otherwise you might as well stick to simpler input devices or go back to pencil and paper.

Both the manual and the software supplied with the Grafpad leave something to be desired. The ads say, 'These programs will give the user enough information to create his own application programs' – true, but the user will have to unravel the listings before he can write additional software.



Self-portrait: Grafpad drawn with software modified for dot-shading and printed with a separate Epson screen-dump routine

Two programs are supplied on tape or disc. The disc version of the main program

page 151 ▶


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◀ page 148

involves the use of overlays because of the limited memory available in graphics mode 1. The first program simply displays the screen location of the stylus in tablet X and Y co-ordinates, screen co-ordinates (X*4 and Y*4), whether the stylus tip is depressed and, if the stylus is in the menu area, which option square has been selected. This program is the simpler of the two and is probably the best one to study to find out how to write your own software.

The other program is a basic mode 1 drawing program that allows lines, circles, rectangles, triangles and other simple shapes to be plotted and gives the option of free-hand sketching. For some reason the drawing options are selected from the keyboard rather than using the menu area on the tablet, which was surely tailor-made for this purpose. Any shape can be filled with colour, having first selected a start point with the stylus. This routine is unfortunately too long to reside in memory along with the main program on a disc-based machine and is called as an overlay.

While this program serves as a good introduction to what the tablet can do, I think most purchasers will eventually want to write their own software and it is in its lack of guidance that the manual falls down. To its credit, the programs supplied are listed in full, with separate versions for tape and disc, but with few REMarks and few meaningful procedure names. In fact, their author seems more keen to use subroutines, computed GOTOs and unconditional GOTOs, all of which make the programs difficult to follow. The manual contains no other hints on writing your own software for the tablet, so the only way is to study these programs.

A short machine routine is necessary to access the user port and thus enable the tablet to return co-ordinates and advise whether or not the tip is depressed. The assembler routine is different in the two sample programs but there's no explanation as to why.

Getting on to its more positive aspects, once you have decyphered the listings in the book the tablet is quite easy to program, using one of the machine-code driver routines. No setting up is required and screen co-ordinates can be returned directly each time the tip of the stylus is pressed, although in some positions the cursor tends to oscillate between two adjacent pixel positions. As the machine code driver routines are capable of returning many sets of co-ordinates per second (up to 6000 pairs/second, according to British Micro), I found that by averaging out several sets of co-ordinates it was possible to greatly reduce the jitter that can appear on freehand sketches or tracings.

The surface of the tablet is protected by a removable perspex sheet, which is useful for holding down artwork to be traced. Even when paperwork is placed on top of the perspex the stylus will work through a thickness of several millimetres without its accuracy being affected. The lower part of the stylus shaft is made of aluminium and appears to be an essential piece of screening. If the stylus is held higher up, where it is plastic, the output can become unstable. It might have been more sensible to make the entire shaft conductive to avoid this problem.

The resolution is such that fine detail on a small original drawing may be lost in transferring it to the screen, so it is wise to make your original drawing on paper as large as possible. It can always be scaled down on to the screen, whereas a small original cannot be scaled up without the lack of detail becoming apparent. It takes practice to co-ordinate hand and eye to draw freehand on the tablet and I find it easier to trace a preliminary sketch.

The main drawing program incorporates an option to obtain hard copy from the screen. Unfortunately, the manual doesn't say which printer it is intended for. On my Epson RX80 it produced a series of short alpha-numeric strings, some of which looked like pairs of co-ordinates. I phoned British Micro and was informed that it was intended for an Epson FX series printer (in which case it should have worked with my RX80). Further investigation revealed that it worked with a Tandy CGP-115 plotter/printer. This is good news if you own one of these colour plotters, but this vital piece of information should have been mentioned in the manual.



Despite my reservations about the documentation (still the weakest point of many computer peripherals), I found that the tablet performed well and appears to be built to last. To make full use of it you need to be confident in writing your own software or be prepared to buy further programs as and when they become available (I understand British Micro sells a separate CAD program for £20.70).

The price of the tablet seems reasonable for hardware of its type, but the package would be more attractive if a little more thought went into the manual. At present the Grafpad has no real competition as far as the Beeb is concerned but this situation could soon change with the introduction of low-price 'touch-pads' (at presently available only for other computers) that fulfil many of the same functions, though generally at lower resolution. **Malcolm Banthorpe**

ONE FOR THE PLANK

Pirate Adventure, BBC B, Chalksoft, £9.25

PIRATE is billed as an adventure 'mainly for your people', but I wonder how long it would keep their interest. The program has three parts, an introduction and two sections of adventure. It uses a split-screen mode 7 display, upper half for graphics and lower for text.

You are the captain of a pirate ship and have to search for treasure, clues and a hidden password, which is your entry to the second part. Clues and jewels are normally to be found on the islands but may also be won by battling with other pirate vessels. The second part puts you on Blackbeard's Island in search of a hidden cave, where lies the pirate chief and a king who needs rescuing. Finishing the pirate off will finish the adventure.

Most of the locations in both parts of the game are accompanied by graphics which are generally well executed, but the text is disappointing. The only input is by function keys, which represent the four points of the compass and the answers Yes and No. This may be easy to use, but tends to prevent any real involvement.

The responses from the program are also slow. There seems little point in displaying text line-by-line for younger players when you can spend as long as you like reading the completed screen.

The concept and graphics are good but the allowances made for the younger user are the wrong ones. **Simon Williams**

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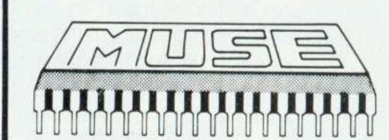
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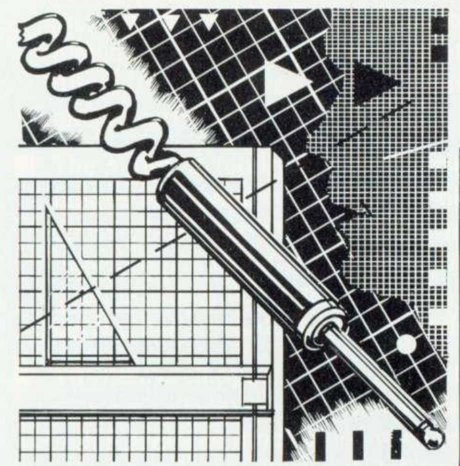
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QUIET LITTLE PERFORMER

Super 3 Microdive, Opus, single drive £230, double £460

THE Opus Super 3 is the latest competitor in the market for 3in microdrives. It differs from the AMS version (*Acorn User* February) in that it is double sided. In other words, it has two read/write heads, so both sides of the disc may be read from, or written to, without removing the microdisc from the drive. The disc side being accessed is determined by using the ✳DRIVE command. The price to pay for this 'extra' is just £4.50, the difference in cost between the Opus and AMS single drive systems. No special microdiscs are required, as those marketed by Maxell and Hitachi as standard are both double-sided.

Software is becoming increasingly available on the microdiscs (watch out for reviews) and the sheer volume of material on 5.25in floppies is the only advantage of the 'standard' disc. The newer microdrives are comparable in price, handier – and the disc cartridges far more robust. Traditional drive makers will have to keep on their toes.

But what about the review drive?

The drives match the Beeb's textured cream finish, with the case constructed in two parts, the main portion being a 'C' section attached underneath to the base by four screws. Removing these screws (not recommended) revealed a single, well-constructed printed circuit board. The read/write head of the top drive was clearly visible, rising through a rectangular hole in the board. The PCB itself sits above a brushless motor capable of 300rpm. The internal overcrowding left me wondering about overheating, but eight ventilation slots on either side seemed adequate as no problems were encountered, despite some heavy use.

The microdrive, being double-sided, is configured in the standard manner with drive 0 uppermost and drive 2 below. Switching between either is done using the usual ✳DRIVE command. At the front of the case is a small light which shows when either drive is being accessed. The drive specifications are striking, with a track-to-track access time of 3ms and a transfer rate of 125 baud.

Microdiscs, one of which is supplied, are accepted only with side A uppermost, clicking firmly into position. A large rectangular push button below the loading slot will eject the disc.

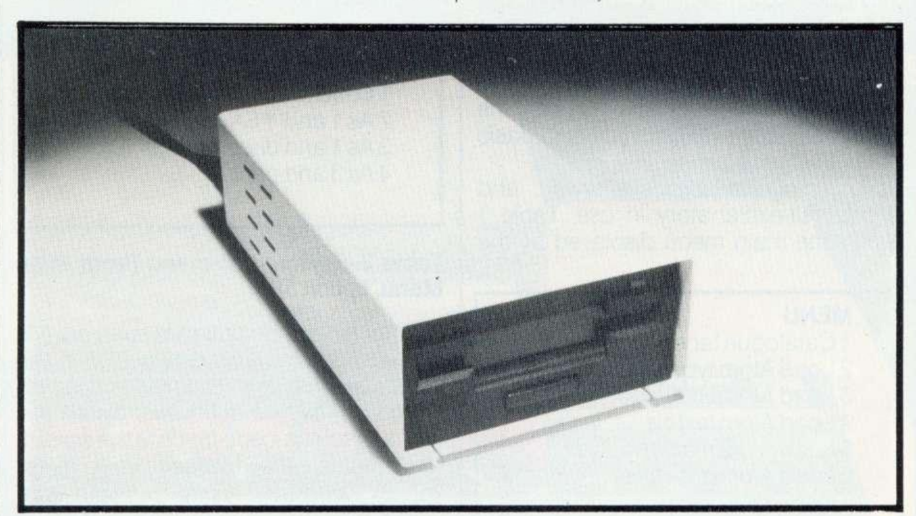
Supplied in the package is a utilities disc which gives a six-option menu: A FORMAT; B HELP; C Opus; D SDUMPS; E SMOVE; F VERIFY.

HELP gives a series of useful screen pages covering areas such as disc care and handling plus a resumé of the standard DFS commands (ie those implemented on Acorn's DFS). Options A and F allow new discs to be formatted and verified to 80, 40 or 35 track specifications, these commands not being implemented on the Acorn DFS.

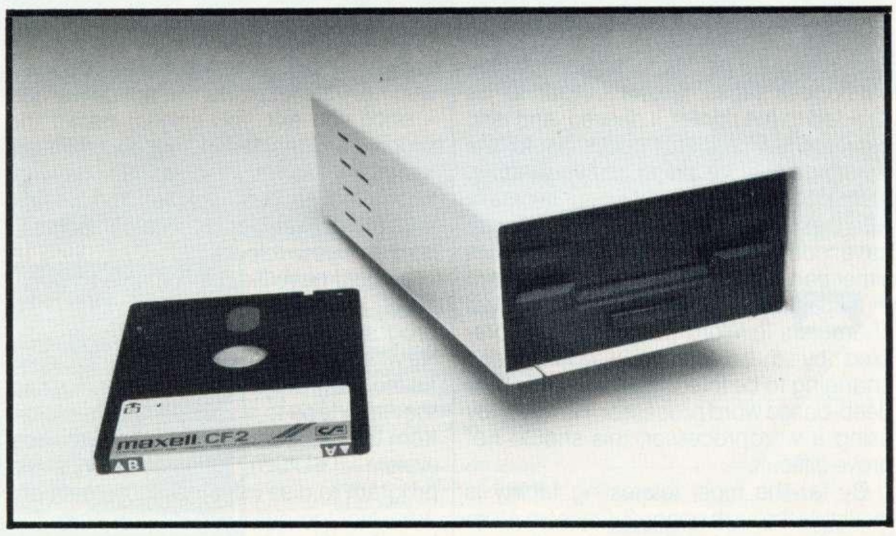
Option D provides useful printer screen dumps for the Epson series, Star DP510, CTI CP80, NEC 8023BE and Centronics 739 (that must cover almost everyone!). Option E is a useful addition to any disc-based library, being a machine code routine that will relocate and run a Basic program from the standard DFS page of &1900 to the tape default setting of &E00, thus allowing long programs to be loaded, down-loaded and run. Finally, option C reminds you of the phone number and address of your friendly Opus dealer!

The manual supplied is written specially for the BBC micro and provides ample documentation on the utilities disc and DFS commands. The drive uses the Beeb's power outlet, and, of course, a disc interface needs to be fitted.

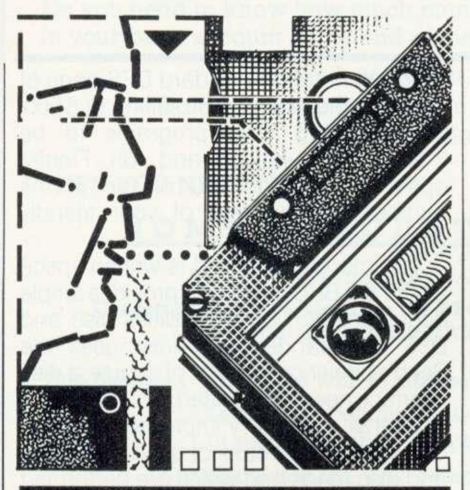
Overall, I was very impressed with the Opus System: its ease of use is first class and disc reads and writes are performed with hardly a whisper. The only problem I encountered was when trying to run the HELP pages with the Watford 1.3 DFS. Each time, an 'Illegal character' error resulted – a quirk of the Watford DFS which seems to interpret a call to directory A by the utilities disc as a control code! The system is certainly unobtrusive and, with many software houses providing their wares on this medium, is well worth considering. At £229.95 including tax, an excellent buy. **Bruce Smith**



Opus 3 inch drive: the size of a copy of *Dune*



Maxell and Hitachi 3 inch discs are compatible



A GODSEND TO ATOMISTS

Atomload, Ecce Productions, BBC B, £9.75

MANY Atom owners must have regular access to a BBC micro at school, at work, or even as a second micro in the home. Wouldn't it be nice if your Atom programs could be transferred onto the Beeb? If only the cassette systems and the Basics were compatible ... Bringing this a little closer to reality is the Atomload utility from Ecce Productions. Not only does it load standard Atom tapes directly into the Beeb, but it can also convert Atom Basic into BBC Basic.

The program is menu-driven and largely self-explanatory in use. Table 1 shows the main menu displayed by the

MENU
1 Catalogue tapes
2 Load Atom type BBC Basic
3 Load Atom Basic
4 Load Atom text file
5 Load Atom machine code
6 Load Atom data files
7 Exit

Table 1. Atomload main menu options

system, each option selecting one or more sub-menus. The first option, which catalogues tapes, allows output to be directed to the printer, if desired, and also makes an 'intelligent' guess as to the nature of the file being catalogued, ie, Atom Basic, machine code, etc. Owners of BBC Basic boards and Atom's Word pack have not been forgotten, for files from either can be loaded using options 2 and 4 respectively. Of course, the control characters in Word pack (normally prefixed by a full stop, '.') would need changing to be interpreted correctly by a Beeb-based word processor. However, by using a wordprocessor, this should not prove difficult.

By far the most interesting facility is available through option 3. Once an Atom Basic file is loaded the routine displays each line in Atom Basic, with a suggested BBC Basic translation beneath. You may edit the line in the usual way, using the cursor and copy keys. Pressing return at any stage displays the next line in the program. When all lines have been displayed, the program is listed (all too quickly!) on the screen, and a save sub-menu appears, to allow you to store the file as a BBC-compatible tape in BBC Basic. You must remember at this stage to remove the original Atom tape and insert a new one – Atomload does not remind you of this, and you could easily overwrite valuable data on the original tape.

Ecce doesn't pretend that the conversion process will cope with every single eventuality, but it certainly eliminates the drudgery of routine conversion, and the editing facility ensures that any incorrect conversions can be overridden.

If you wish to load and store your Atom Basic file in its unconverted state, then you can use option 5 to trick the system into thinking it is a normal machine code file, and no Basic conversion will occur. Table 2 shows the sub-menu presented when

Load Atom M/Code Options
1 Load to specified address
2 As 1 and *SAVE
3 As 1 and dissemble
4 As 3 and print

Table 2. Typical sub-menu (from Main Menu, option 5)

the machine-code option is selected. It is typical of the variants available with the other options. For example, choosing option 3 in this sub-menu will 'dissemble' *(sic)* a machine-code file onto the screen. Unfortunately the disassembler in question isn't bug-free. A pity, for apart from giving me an uncomfortable feeling of déjà-vu, such niggling oversights really don't do justice to the package, which is otherwise rather good.

Returning to the main menu, options 6 and 7 are self-explanatory, but be warned – once you exit, you cannot restart the program. Considering that Atomload is some 54 blocks long, it can be very frustrating to find you've accidentally selected option 7, or hit break. It seems to take an age to reload.

I would have liked to be able to select MOS (*) functions from within the program. Imagine you have an Atom tape file which you want to save on a BBC disc. As the program stands, you need to load the Atom tape to a specified address, exit from the program to select the disc filing system (*DISC), then *SAVE the program to disc from the above memory area. Not too awkward for one Atom file, but what if you have several? Reloading the Atomload program for each file could be a time-consuming exercise.

Despite these minor criticisms, I recommend the program. I have found it totally reliable in loading all kinds of Atom tapes – in fact, even more reliable than on the Atom itself! It's also rewarding to know that the hard work of developing your Atom programs can be exploited on other machines. The in-built conversion should prove to be a great time-saver. There may be faster ways of transferring Atom/Beeb data (modesty prevents me from mentioning the utilities in December's *Acorn User*, page 107), but for those wishing to transfer individual programs with the minimum of fuss, Atomload is a godsend.

Vincent Fojnt

THE BEEB CHEATS!

Canyon by Peter Voke, BBCSoft, model B (any OS), £10

CANYON is an exciting game of skill, cool judgement and quick reactions; well that's what the eight-page instruction manual(!) tells you. Unfortunately I found, what is otherwise a good concept a bit on the monotonous side.

The idea of the game is to fly a biplane from Asdel, which is at the top of one canyon, to Xar which is at the end of the twenty-fourth! Each canyon is longer and narrower than the previous one, and the islands that populate the stretches of water become more frequent and difficult to avoid.

As you sweep down towards Xar, the warring fleets of her Electronic Highness the Robot Emperor of Xar pounce. Beamers are stationed from the second canyon, which fire sideways and can send you into an uncontrollable spin. Other Xarian nasties include fighter bombers, missile boats, mines, gates of fire and the ultimate deterrent, the Imperial Flagship. If you get shot or crash due to reckless flying, your Asdelian reincarnation allows you to attempt a second or third rescue mission.

Like many games these days, the more controls the better, and *Canyon* responds to 10 keys in all. The graphics are reasonable, with downwards scrolling effectively used, though the canyons are not particularly realistic. The sound effects are good and one neat feature is an autoplay which switches itself on if no key is pressed within half a minute. The beeb then plays itself, though it does seem to cheat!

And scoring is not what it used to be. I managed to get a high score of just 65. This is because you get points deducted if you get beamed or shoot down a balloon.

A bit run of the mill, but compulsive once you start playing.

Bruce Smith

SHOW SOME COMMOTION

'Beasty', Commotion, BBC B, £49.95 inc VAT (servos £14.95).

WRITE a review of the Beasty? Visions of wierd monsters with studded leather belts and coshes appeared. 'Oh! it's a robot! Ah well, in that case ...' – and I was hooked.

What do you get for £49.95 (inc VAT)? A data cassette and servo control module come packaged in a rather flimsy box the size and shape of a software box. The control module can be used with most servos, but those supplied at £14.50 each are Futaba RC types, which are packed in plastic cases. The control unit uses a single line on the user port and takes its power from the auxiliary power socket, a disadvantage for those with disc drives that don't have their own power supplies. Up to four servos can be powered from the control unit.

What are servos? They are little black boxes (though you can get quite big ones) containing a reversible DC motor which by means of an internal gearing system drives an output shaft capable of rotating through 100 degrees. To control the position of the servo output shaft you send it a train of pulses. The electronics inside the servo sense the width of the pulses and set the position in proportion to it. The control unit is a standard radio control circuit that takes signals from a single channel (the computer's PB7 line) and decodes them into four separate pulse trains, one for each servo. These controllers are not very expensive, so why does the Beasty cost £49.95? The answer is, some very clever software that generates the control signals.

One immediate negative for the system is the manual (referred to as the *Trainer's Handbook*), obviously produced by photocopying some cut-and-pasted sheets and containing a number of errors and omissions. To be fair, though, the review manual was described as a 'provisional' one.

Having unpacked the bits you assemble them. 'Take care to orient the plug correctly', says the manual, 'or damage may occur'. Guess who didn't, and spent ages later wondering why nothing was happening? But no harm done and I loaded the program. I typed *RUN ROBOL and as soon as the program had loaded a display appeared on the screen. To observe the habits of the Beasty at first hand I'd spent two feverish hours in the workshop knocking up a simple robot arm, using three of the four servos. On loading the program the servos were initialised in their mid-positions so the arm shot up in the air, span round and clouted the poor cat on the nose! If you haven't used servos before, you'll be surprised how quickly they can move and how much force they can produce. Ask my cat!

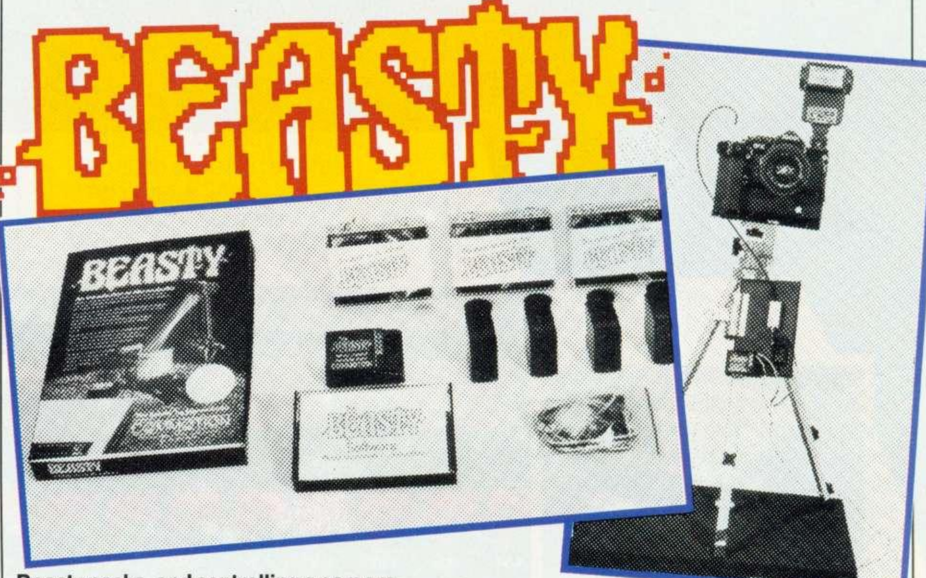
The screen display consists of lines of instructions about a control language called Robol (a technical author with a sense of humour!). Each line starts with what is effectively a line number, then follows a key word, for example MOVE or JUMP, and finally four numbers between 0 and 996 which indicate the position of the four servos. These numbers may be increased or decreased from the keyboard in jumps of 4 or 40, and the servos follow. When the final positions have been determined, the return key is pressed to enter the line and initialise a new one. Thus a program can be built up from a number of entered command lines.

To execute the program you press function key f0. The system then steps through each line in your pseudo-program, executing it by moving all the servos simultaneously. MOVE and JUMP speeds, which may be programmed, are displayed at the foot of the screen. The f0 key is also used to halt the program, which can lead to confusion. When it is pressed, the program finishes the execution of the current line before stopping. There is no on-screen indication as to whether the program has stopped or not, so the tendency is to press f0 again (did I really press it first time?).

On-screen editing of the program is possible using the function and cursor keys. The results are passable, if a little bewildering at times. One gripe is that the display refers to JUMPs and MOVEs in terms of speed whereas the numbers used are actually the programmed delays. Hence a displayed speed of 250 is really the slowest rate of movement whereas 1 is the fastest.

Having completed your program, pressing the escape key puts you in the COMMAND mode. Commands available are NEW (beware, there's no OLD), SAVE, LOAD and * (for passing instructions to the operating system). Abbreviations are not supported and while you are saving, power is removed from the servos, so if your robot arm is carrying a load it drops it. On loading a new program, the servos re-initialise at the position indicated in the first line of the program (cats beware!).

In conclusion, the Beasty is an extremely good, low-cost way of getting into the fascinating world of robotics. Apart from the obvious errors in the manual, the information given is clear and explicit. You can extend the programming capabilities by including on the tape a machine code driver routine that can be called from your own Basic programs. While I would not expect to see many Beasties in advanced robotics systems, for the teacher or hobbyist the system represents a good buy. But remember that you must do the mechanical work of building the arm or whatever device you want to control – unless you program a Beasty to do it.



Beasty packs, and controlling a camera

Stop Press the new manual has just arrived and it lives up to all the promises Commotion made. With it came a function key overlay, which makes life a lot easier. Commotion also assures us that the next batch of Beasties will come in stronger boxes. They have also changed 'speeds' into 'delays' and changed the Robol program to allow abbreviations LO. and SA. Would that more companies responded like this!

Let's allow Commotion the last word: 'We will shortly be marketing a Beasty Arm mechanism at £39.95 (not including servos or controller), and on the subject of "advanced robotic systems" we would like to point out that both R2D2 and ET were controlled with RC servos and that we have supplied Beasties to Pinewood Studios and the Droid Factory!' The mind boggles! **Paul Beverley**

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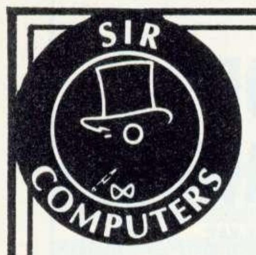
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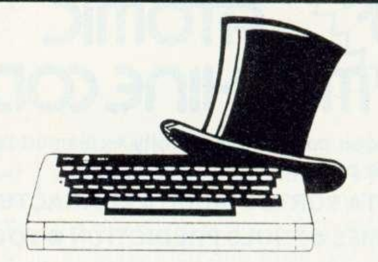
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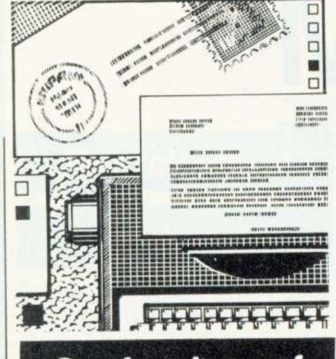
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Confessions of a pirate

Sir, Despite my lack of inclusion of an address, I trust you will treat this letter as genuine. I am what is called 'a software pirate'. I swap programs. I do not, however, sell or in any way obtain money from any of this piracy. I have written to you because I am fed up with constant arguing about piracy. So let me tell you why and how I became a pirate.

I bought my Beeb two years ago. As you are probably aware, there was very little software available at that time, and most of that was either available mail-order only or from shops that didn't have any Beebs to display it on!

The first program I bought was *Swoop* from Program Power. This I was and still am pleased with. Then I bought the following programs: *Polaris*, *Golf* and *Space-Warp* (Bug-Byte); *Games of Strategy* (BBC); *Eldorado Gold* (Program Power); and *Space Pirates* and *Dragonquest* (Bug-Byte).

The first two, *Polaris* and *Golf*, were exchanged several times as none of them would load. When I finally got working versions I found that the programs were rubbish, a total waste of money! *Space-Warp* was graphically very good, but presented no challenge. *Games of Strategy* was not what I had expected when I inspected the *sealed* pack. *Eldorado Gold*, a supposed adventure, took me an hour to complete. *Space Pirates* was boring and *Dragonquest* I completed in just over ½ hour, the first time I played it! Then I discovered that the much-vaunted *Dragonquest II* was not to be produced!

I bought these programs over four or five months so you'll appreciate that since I'd used all my available cash I was disappointed.

I did buy some programs after these, notably *Philosopher's Quest* and a couple from A & F. All were good value, though if I had seen them first I might not have bought them. I began to feel that the advertising these companies gave to their programs was exaggerated. I eventually answered an advert in a magazine, expecting to swap my original programs for other originals. The person concerned wanted to swap copies. I did so, continue to do so, and now have all the programs I want. Of these, perhaps 20 per cent are worth having. The interesting thing from my point of view is that if I'd had the money I'd have bought about 70 per cent of the programs. What a waste of money that would have turned out to be!

So let's set the record straight. Most advertisements about programs are untrue and misrepresented. If all programs were in the region of £5 each or less, and transferable to disc, then I would buy about five programs a month, provided, if I didn't like the program, I could return it. I know that invites piracy. Well, if the programs were good or if the software house had confidence in their product then they could do this, and piracy would probably decrease.

Now let me name names. Obviously not all software houses produce uniformly bad software. However, the following software houses produce at least 90 per cent bad software. That is, re-hashes of existing programs, programs that are very short yet cost a lot, or are just plain bad: Bug-Byte, Program Power, Gemini, Software Invasion, Salamander and Quicksilva. I have praise for Level 9 and Acornsoft in particular.

So finally, let me make two points again. If it hadn't been for the poor quality of the software available when I first started swapping, I wouldn't be swapping now. If software houses treat us better, then, I for one, would stop ripping them off. So stop all this bitching about swapping and put your house in order!

A Pirate
Manchester

A fortune in software

Sir, I very much support the views on software prices and illegal copying set out in the letters from Messrs Rogge and Loening in the March 1984 *Acorn User*.

While no-one would want to encourage illegal copying, I have long suspected that the high price of even the most mediocre games software is a positive incentive to piracy. As Mr Rogge points out, the software companies look to the same age group for mass sales as do the record companies; both products give minutes or hours of pleasure according to taste and whim but there is a world of difference in the prices. The software companies also, in my view, indulge in the most misleading form of advertising when they depict their games as full-colour science fiction fantasies. Granted, their aim is to part customers from their pocket money but many of the advertisements and packages now used give a totally false impression of the products on sale.

The software industry is continually moaning about lost sales yet we frequently read about individuals making fortunes from designing a new game (or more probably producing a variation on an old one). Companies also advertise for new ideas on the basis of the large sums to be made. There also seems to be no shortage of companies offering to swap software of varying quality for our hard-earned cash so the game must be worth playing – even more so as prices seem to be continually creeping upwards.

Your comment that software suppliers charge what the market will bear seems to sum up the fact that prices are set at such a level as to give all concerned in the chain of distribution a very nice whack. I wonder what would happen if some enlightened software company decided to drop prices as your previous correspondents have suggested? Would the rest follow?

My suggestion to the software people is to stop moaning, to concentrate on counting their money and make the most of the market while it lasts. They might also think of their public instead of themselves occasionally and lower prices to £1-£2 per copy so that it would not be worth while making illegal copies.

However, I suspect that they will continue 'to charge what the market will bear' and keep moaning all the while that they are making only one fortune instead of the two they deserve.

J C Perry
Barking, Essex

'Free' software

Sir, On the subject of software piracy, there may be a simple solution. The quantity and quality of software is probably increased with increased financial incentive so that someone has to offer programmers money for their programs. However, the same market forces apply to piracy. The only way therefore to reduce piracy is to reduce price. But given this, the first point would be damaging to the industry. But only if programmers' income is related to direct sales of their product.

The most complex, intelligent and expensive piece of software that most people will ever run on their machines is given 'free' with the machine. Lack of software spells death for most computer manufacturers. A manufacturer could commission work before launch of a product, add the price to the machine (this works with languages bought 'out' and operating systems produced 'in shop') and give the software 'free' with each machine or charge a token price.

Free software and no incentive for piracy, money for the programmer, the incentive to write and a suite of software for the new machine greatly increasing its value. This system would require no legislation, need not interfere adversely with the present system and has nothing to do with current copyright laws (which in my opinion should be scrapped altogether as they only protect companies large enough to afford the legal action).

H Andrew
London

ASK a silly question, pass a fair comment, stage an angry protest – we don't mind what you write to us about (or about us!). Keep 'em short, keep 'em sweet, but keep 'em coming! The address is: Letters, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Overcharged for discs?

Sir, Congratulations on your excellent publication. I was one of the lucky people who got a Watford DFS upgrade free of charge but I had to write a pretty stiff letter to do so.

Why do the software suppliers make such excessive charges for supplying their programs on disc? The few who do, ask an extra £2 to £4, and some have the cheek to ask for an extra £1 for 80-track. I can buy good-quality discs for £1.50 and I am sure the software people could get them for half this price in bulk.

There is no excuse for charging more than £1 extra for 40 or 80-track discs, and I hope you will take a strong line editorially about this. I see you are offering some software on cassette only – why not on disc as well?

I have joined the Format 40/80 Club which serves disc users. It has an excellent monthly journal on disc, and also supplies software on disc, usually at bargain prices, as well as a variety of hardware. I am very pleased with the services provided by this club, and wish the organisers all success.

A McMillan
Bristol

Service with an upgrade

Sir, In response to the letter from Mr K Pretorius and your reply in the April issue of *Acorn User* on the responsibility of the press regarding software protection (or unprotection), may I state that Micro-Aid has a policy of replacing free of charge any program in which a user not only finds a bug (heaven forbid) but any suggested improvement in a program which is valid will be incorporated immediately and an update sent free of charge to that client.

We deplore copying but believe that an honest user has the right to make a copy of a program and to alter it to suit himself. Many of our clients enjoy doing this and report back some very interesting and useful changes. In some cases we incorporate these as part of the program for the benefit of everybody. Hence the Aid in our name, which means help to everybody. This does not work with protected software, but I don't blame games producers for wanting to do everything they can to save their businesses from doom by protecting their software.

We use a system of sequential user numbers in some programs and offer an upgrade service for a few pounds a year, which keeps users informed of any changes. If we find two user numbers the same we can trace them back through the dealer who sold it and deal with the matter. On other programs such as payroll we insert a password which clients have to telephone us for. We believe this system helps eliminate unlawful copying and distribution – would you ring us knowing you had stolen a program?

Colin Chatfield
Micro-Aid
Camborne, Cornwall

Code riddles

Sir, Would you publish this as an open letter to all competent machine code programmers.

I am sure there are a number of people like myself who, although able to handle most m/c problems, are at a loss as to how many of the impressive trigonometric aspects of games are handled.

For example: how did the author of *Planetoid* manage the explosion effect of the characters? How are sine, cosine multiples handled in m/c?

An article giving away a couple of tricks in this area would make fascinating reading indeed! I should say it is about due, gauging from the current interest in m/c and assembler.

Finally, may I offer congratulations on maintaining the high standards of features and articles in your magazine.

John Bend
London

My DFS shock: 'Disc Full'

Sir, I received a Watford Electronics DFS 1.30 just before Christmas. My model B has an issue 3 PCB and a Teac FD55F supplied by Viglen. Unfortunately, the DFS has an intermittent fault. After formatting my first disc I tried to save a three-line program. Shock – Disc Full!

*CAT showed 00 files of 62 on 80 tracks.

*HELP SPACE showed 31C sectors free.

I have also been told 'Disc Full' while transferring files from cassette to disc. This condition remains unchanged unless I first load a file from disc – ie, reading a file appears to clear the condition. Disc Full has also occurred after a hard break. Is something being initialised incorrectly?

Incidentally, the Beebug review of the Aries B-20 says Acorn has given Cambridge Computer Consultants exclusive rights to use *FX111, so why is WE using it?

With reference to the letter by Stephen Fox in the April *Acorn User*, my 1.30 does work on drive 2 but the message &BC78 is quite different:

'Welcome, Earthling to the wonderful world of Watford ROMs. Specifically to the truly wonderful DFS. No other compatible DFS offers you so much. As you might understand, we are rather proud of this ROM, especially the truly etherial author Andy Bray (lichanthrope extraordinaire). Due to the extreme quality of the Watford DFS 1.3, I am extremely touchy about unauthorised copying, so if you indulge in this activity, do not be surprised to see upon your door step one of the following: Martin Poole, Shilraz Jessa, a pack of werewolves, the Trinity Mafia, a pregnant Sumo wrestler, the Watford Mob (those that totally mashed a combined team of Watford, Chelsea and Fulham supporters). Due to the extreme reliability, power and general hunkiness of Watford DFS, we have now decreed that Watford DFS is the de facto standard which all other DFSs are compared. Hence Acorn should follow our standard. ACB'

I assume the message at &8283 is the same in all DFSs.

Finally, could *AU* publish a pull-out of all 256 error codes? – something sadly missing from the *Advanced User Guide*. For example, 'at line xyz' (ERR=60) and similar unlisted codes are a pain in the spinal column, actual location irrelevant!

P Hinchliffe
Chelmsford

GOTO it, girls!

Sir, I am replying to G Sargent's letter (in the magazine dated March 1984). I woke up on Christmas '83 morning and opened up all of my presents. Then my mum and dad handed my brother and I a big box. We opened it up and there was a BBC computer!

I am nine years old and I am very interested in computers. I agree with G Sargent that some girls do not have enough encouragement. So, all you girls out there ... get on a computer and show the boys what you can do!

I would be glad to hear from somebody else with a BBC model B computer.

Emily Christy
Byfleet, Surrey

White Knight champion

Sir, I read with interest the reaction to your January review of the *White Knight* chess program in the April issue of *Acorn User*.

The *2.32E* chess program of Mr Thompson will unfortunately sacrifice, given a chance, a piece (even its Queen) in the first few moves if played in the usual range of one to three minutes per move. Fearing a bad tape, I checked this against an earlier *2.32C* version but the fault persisted.

Acorn's own *Chess* is better but still requires inordinately long times to give a good-class game.

However, I can assure your correspondent Mr Arrey that *White Knight* is in quite a different class from all the other programs currently available for the BBC B. In fact, I found it on a par with my dedicated machine costing well over £200.

Since Mr Bryant may read these lines, may I make a few suggestions for the future development of *White Knight*?

Obviously a limited memory space makes choices very difficult, but would he consider: a) more variety in the opening repertoire, both as white and as black; b) longer time automatically taken for the endgame to be comparable with the excellent middle game or the promlem-solving capabilities; c) facility to save games available on most other programs; d) eliminating Return in keying moves in (even at the expense of the occasional mistake)?

Finally, would it be possible to iron out the only technical bug I

could find (and verified against a purchase of another copy of *WK* – I only hope I won't be told it is my micro that's at fault!)? Could the facility of forcing the program to move by pressing any key be modified so that it cannot happen automatically (uncontrollably) in normal play? This can spoil a good game at the wrong time and invalidate the longer time-settings. I use *WK* almost daily and most of the time it behaves impeccably, but when the bug appears – without any rhyme or reason – it can spoil the enjoyment of the otherwise most excellent game.

R B Vocadlo London

Gemini printer settings

Sir, We were pleased to read R J Spencer's letter in the February issue of *Acorn User* with his comments and advice on the use of Gemini's Beebplot and Beebcalc programs.

We would, however, like to set the record straight by offering our own suggested alterations, which we normally supply on request. For cassette versions, list line 60 in each program and change LDA#10 to LDA#32, ensuring that the rest of the line remains unaltered. Save a fresh copy of each program.

For disc versions we recommend that the change is carried out on a backup copy of the disc, and the instructions should be as follows:-

a) Place the new disc in drive 0, and type *ACCESS *
b) Type *LOAD DUMP 1DC2
c) Type ?7773=32
d) Type *SAVE DUMP 1DC2 1EB2

We would also like to emphasise that these changes need be implemented only on an Epson printer that has been set to auto line-feed.

We hope Mr Spencer and other users will find these alterations helpful and will continue to enjoy using our programs.

P S Meherne
Senior programmer for
Gemini Marketing

Easter egg-on-face

Sir, After browsing through your thoroughly enjoyable magazine, I was overjoyed to fine Paul Caswell's program for the definition of Easter Sunday.

Having been a church officer for a number of years, I had visions of a short program to end my continual search through either the Book of Common Prayer or the Lectionary for the almost unusable table of movable feasts.

Imagine therefore, my surprise, when I turned the page, to find the program missing, just blank pages.

While I realise that in the editorial Paul described this exercise as a challenge, I did not realise that this was intended for the poor reader also. Unfortunately, my holy modem seems not to work, or more probably, the poor saint at the other end has become disillusioned with his penance. I even tried prayer, but that was lifeless too, so Paul, if you have a direct link with the Almighty, pass it on, otherwise I will have to go to confession (Oh, the thought!) to try to get a line to the exalted one.

I await your reply (before Easter?).

Dr Barry J Featherstone
Ross-on-Wye

Our own movable feast, Paul Caswell's elusive program, appears (God willing) on pages III and IV of this issue. May we be forgiven for mislaying it last month!

More from a modem

Sir, I have been a subscriber to the magazine since its inception and read with great interest the article by John Coll headed 'The BBC micro dials the world' under Electronic Mail in the October 1982 edition. The article begins 'Simple software can transform the BBC micro into an intelligent terminal...'

I have bought the acoustic modem from Micronet which allows me to access Prestel. I recently bought the Buzzbox modem from Scicon and looked forward to accessing databases such as Rewtel, Distel and British Telecom Gold.

However, despite reading the user guide and finding that the FX7 calls allowed me to set the baud rate for both transmit and receive data, I have not been able to get any intelligible interpretation of the machine code received on my BBC micro.

Could you advise me whether I have missed an article in *Acorn User* telling me how to convert my machine into an intelligent terminal to receive data down an acoustic or other modem? If not, could you publish such an article?

If, in nearly 18 months, an article such as this has not been published, could John Coll's comments towards the end of his article that the suppliers of databases do not really want to be involved with individual users explain the lack of publicity for such software?

H Burnham
Berks

First of all, we print the simple five-line Basic program that we use to access Telecom Gold, via an acoustic coupler, courtesy of Joe 'Jottings' Telford. Not having had a Buzzbox yet, we don't know what changes are needed.

Why terminal software isn't provided with modems is one of the world's great mysteries. We suggest you join Forum 80 to get the best out of your equipment. Their address is 421 Endike Lane, Hull HU6 8AG.

Program for accessing Telecom Gold via acoustic coupler

```
10*FX7,3
20*FX8,3
30IF (?&FE08 AND 1)=1 THEN PRINTCHR$(?&FE09 AND 127);
40A$=INKEY$(0):IF A$<>"" THEN ?&FE09=ASC(A$)
50GOTO 30
```

Business potential

Sir, I'm sure I am not alone in being a relative ignoramus when it comes to computers but wish, as a manager of a small business, to realise their full potential within our day-to-day activities.

Although I have visited many computer shops and, to the best of my ability, studied learned magazines such as your own, I find it virtually impossible to get a broad-brush view as to what I need.

I have recently purchased a BBC B with disc drive and printer and wish to link up five or six more Beebs via British Telecom for quick interchange of data between our various locations. Secondly, I need to extend the power of the BBC B which, when using virtually all the RAM on a Beebcalc program seems barely quicker than a hand-turned calculator.

These two requirements have confused those who profess to be in the industry. No-one seems to have a modem with compatible software for the link-up and nobody seems to know how to expand the power and the processing speed of the BBC B at a cost-effective price.

To whom, if anybody, can I turn?

L J Packer
Bristol

The simplest way to connect two BBC micros together by phone is to use an acoustic coupler with terminal software. For this to happen both micros must be plugged in at the same time.

A more sophisticated method is to join an electronic mail system such as Dialcom, run by Telecom Gold. This allows you to send messages which are stored on a mainframe computer to be read by someone else later. It also gives access to various databases and other networks.

Telecom Gold is set up for business users, and the address is 42 Weston Street, London SE1 3QD.

If you want to extend the power of your BBC micro, the answer is the 6502 second processor reviewed in this issue. We doubt if *Beebcalc* will run on the system, but Acornsoft's spreadsheet, *Viewsheet*, will, and should be available later this year.

The slowness of *Beebcalc* was one of our criticisms in last October's issue.

Without knowing exactly what you mean it's difficult to comment (flickering?). Try synchronising screen changes to wait for VSYNC before plotting or deleting things. This may help.

Sync or flicker

Sir, I am getting annoyed with a flickering that occurs when moving user-defined characters around the screen. Could you please direct me towards 'smooth' graphics.

Richard Möring
Sutton Coldfield

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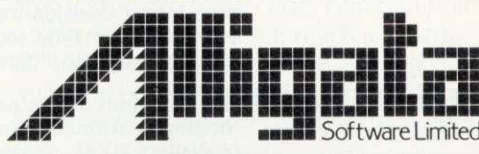
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With this Forth, David Husband has provided the BBC Micro with capabilities never before realised. And being 16K rather than 8K is twice the size of other versions. Multi-Forth 83 is supplied with an extensive Manual (170 pages plus) and at £40+VAT it is superb value.

Order it using the coupon adding £2.30 p&p (£5 for Europe, £10 outside) or if you want more information, tick that box instead. Either way, it will put you one step ahead of the competition.

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ACORN USER. Sixteen different back issues £5 plus postage. Goulding, 15 Church Street, Falmouth, Cornwall TR11 3DR. Apply with phone no.

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